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ABSTRACT

A sample of 145 people representing eighty farm operations and a statewide sample of 233 agricultural and agribusiness workers participated in a study to identify competencies, their importance (on a one to five rating scale), and the performance level required of a beginning farm operator in each of the following five cluster areas considered important to the agricultural economy of southwest Wisconsin: agricultural mechanics, farm business management, dairy production, livestock production, and crop production. It was anticipated that results would be useful in setting curriculum priorities in vocational agriculture programs. A survey instrument using a Likert-type scale was administered to participants to obtain a mean value for each duty and task in each of the five clusters. The survey instrument was then modified and re-administered to determine performance levels. Each duty area and its separate tasks were rated based on the amount of outside assistance needed to complete duties and tasks. Results showed that a majority of the duties and tasks listed are of high or extreme importance for survival and growth as a farm operator and that a farm operator must rely on his/her own skills and expertise, acting for the most part, independently of outside assistance. (The major portion of this report consists of the rated duties (seventy-nine) and tasks for the beginning farm operator, grouped according to cluster. Recommendations for the farm operator technician curriculum are included.) (SH)

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ED149052

FINAL REPORT

Project Number 03.004.151.227

Determining Performance Levels of Competencies for Job Entry Required of Beginning Farm Operators

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AUTHOR

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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June, 1977

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CHAPTER I

INTRODUCTION

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS IN THE DUTY CLUSTERS: DAIRY PRODUCTION, LIVESTOCK PRODUCTION, CROP PRODUCTION, AGRICULTURAL MECHANICS, AND FARM BUSINESS MANAGEMENT

STATEMENT OF THE PROBLEM

The technological advances in agriculture production have rendered some competencies obsolete while, at the same time, introducing new competencies essential or at least desirable for beginning farm operators. There is a need to identify competencies of importance to farm operators and to ascertain minimum performance levels required of a farmer. Once identified, these competencies and recommended performance levels may be utilized for setting curriculum priorities, to validate present instructional efforts and to direct emphasis toward discovered needs and performance levels.

SIGNIFICANCE OF THIS STUDY

Expanded utilization of competency based instruction and the desire for greater accountability in education emphasize the need to define those skills and competencies most needed by beginning farm operators. While many competencies have been defined in most areas of agriculture, there is a need in Wisconsin to identify competencies peculiar to the agriculture industry of this state, to determine the significance of these competencies, and to arrive at a minimum performance level necessary to complete the task.

OBJECTIVES

The overall purpose of this project is to determine performance levels of competencies for job entry in selected VTAE programs. Specifically, the objectives of this study were:

1. Select VTAE programs with relevant occupations for study.
2. Identify and analyze task inventories relevant to the selected programs/ occupations considering the following: difficulty of performance, length of time performed, importance of task, and projected need for task.
3. Validate tasks and performance levels required on the job.
4. Translate analysis of tasks and performance levels on the job into recommended performance levels of competencies taught in the corresponding curricula.
5. Field test the performance levels of competencies for job entry for the selected curricula.
6. Evaluation the instruments and procedures developed.
7. Prepare and disseminate final report.

ACTIVITIES AND PROCEDURES

A list of competencies needed by farm operators was prepared, by the author, through a review of the literature and the advice and opinions of Agricultural Division instructors at the Southwest Wisconsin Vocational-Technic,' Institute. The competencies were grouped in five clusters: Dairy, Livestock, Crop Production, Agricultural Mechanization, and Farm Business Management. The 79 duties were further divided into 1182 tasks. This resulted in a survey instrument with expertise in the appropriate subjects.

Once these essential competencies were identified, two groups of survey participants were utilized to obtain data on the significance and critcality of each area. The goal was to obtain a total sample of 100 or more incumbent farm operators.

The initial survey group was nominated by high school vocational agriculture instructors within the Southwest Wisconsin Vocational, Technical and Adult Education District. This group included advisory committee members for the agriculture programs of the institution. In addition to the farmer group, all graduates of the Farm Operator Technician program of Southwest Wisconsin Vocational-Technical Institute were invited to participate in the survey.

A unique procedure was used to obtain the response to the survey instrument at Southwest Wisconsin Vocational-Technical Institute. The husband-wife team of farm operators, nominated by their local high school agriculture teacher, were invited to participate in a work-dinner activity. On April 6, 1977, over 145 people representing 80 individual farm operations met on the campus of Southwest Wisconsin Vocational-Technical Institute to complete the survey instrument. Three cluster sections were completed prior to dinner and two following the meal. A total of two and one-half hours of time was required to complete all five sections.

A second group of participants were obtained by requesting each Agriculture Instructor in the Wisconsin Vocational-Technical and Adult Education system to secure one completed survey for each of the five cluster areas. This sampling would represent the involvement of one to five different individuals to complete the five cluster survey instrument. This group of participants included Wisconsin Vocational Education Advisory Committee members. Using this method, over 200 individuals participated in this study and permitted the comparison of area and statewide responses.

The significance or criticality of each duty and task was obtained by having each participant rate the importance of the task. The following scale was used to determine importance:

OF NO IMPORTANCE 1
OF LOW IMPORTANCE 2
OF MEDIUM IMPORTANCE 3
OF HIGH IMPORTANCE 4
OF EXTREME IMPORTANCE 5

Participant responses were retained in the two sample groups and the data summarized by computer. The mean values were determined by dividing the sum of the weighted responses by the total number of responses for each duty or task.

Once the relative importance of each competency was identified, the survey instrument was modified to determine performance levels. The number of competencies involved prohibited the inclusion of each task in this phase of the study. Also, it was assumed that a specific task under a given duty area would generally require the same level of performance as the assigned the duty area. Therefore, only the duty areas were surveyed for performance levels.

It was hypothesized that the nature of farming dictates a certain level of performance. Farmers function in a managerial or supervisory capacity which requires them to act independent of supervision by others. This meant that a different measurement scale had to be developed. As a result, it was decided that the amount of outside or off-the-farm assistance needed would be an indication of performance levels.

Again, practicing farm operators were surveyed; however, due to time constraints only a minimal sampling was sought. Each participant was asked to rate each duty area based on the amount of outside assistance need to complete that duty. The following scale was used to determine performance levels:

OUTSIDE ASSISTANCE REQUIRED 1

GREAT NEED FOR OUTSIDE ASSISTANCE 2

OUTSIDE ASSISTANCE NEEDED BUT NOT ESSENTIAL 3

LITTLE NEED FOR OUTSIDE ASSISTANCE 4

OUTSIDE ASSISTANCE NOT REQUIRED 5

The mean values were determined by dividing the sum of the weighted responses by the total number of responses for each duty.

CHAPTER II

REVIEW OF LITERATURE

Vocational agriculture educators have developed and utilized approved practices and essential skills for over twenty-five years.[1] Competencies needed in today's agriculture are built on those practices and the adoption of the new technologies.

The National Committee on Agri-Business Competencies was organized in 1973 to identify, validate, and report competencies required for employment in seven agricultural occupation sub-clusters. As a part of this committee James T. Horner at the University of Nebraska-Lincoln wrote competency reports on the production of Corn, Crops (General), Forages, Small Grains, and Soybeans.[2]

Byrd and others edited a number of studies which identified tasks and basic skills essential to livestock and crop producers. These studies provide a broad group of skills validated on the diversified farms of Ohio.[3] A study of educational needs of dairymen was also completed in Ohio by Knight.[4]

Seven clusters of agricultural production tasks were studied by Long in the State of Washington. This study was examined for similarities and to identify unique tasks omitted from other literature.[5]

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[1] Elwood A. Birckbauer and W. P. Mortinson, Approved Practices in Corp Production, (Danville, Illinois: The Interstate Printers and Publishers, Inc., 1967).

[2] James T. Horner, Competencies Required of Corn Producers, Departmental Report No. 46 (University of Nebraska-Lincoln, 1976), p. 1.

[3] Rick J. Byrd and others, An Empirical Determination of Tasks Essential to Successful Performance as a Swine Farmer (Bethesda, Md.: ERIC Document Reproduction Service, ED 115 795, 1975).

[4] Calvin Doer Knight, The Educational Needs of Commercial Dairymen in Selected Northeastern Ohio Counties (Bethesda, Md.: ERIC Document Repro-Service, ED 533 346, 1976).

The Agricultural Industries Department, Southern Illinois University, Carbondale developed seven "program planning guides" for selected agricultural occupations.

The Agriculture Production Guide, Volume I, contains competency lists applicable to Southwest Wisconsin. Volume II, Agricultural Supplies and Services contains competencies related to the safety, handling and use of agricultural chemicals. Agricultural Mechanics, Volume III, contains needed competencies in tractor operation, tractor maintenance, farmstead planning, welding, and electrification. Human relations and language competencies often needed by farm operators are contained in Agricultural Products, Volume IV of this series.[6]

Hoyt researched marketing competencies needed by Iowa Livestock producers.[7]

Spillman and Bruce reported their progress and methods of V-TECS in competency based curriculum developement.[8] Bruce and Carpenter also reported on the Kentucky model of Competency-Based Curriculum.[9]

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[5] Gilbert A. Long, Clusters of Tasks Performed by Washington State Farm Operators Engaged in Seven Types of Agricultural Production (Bethesda, MD.: ERIC Document Reproduction Service, ED 021 067, 1968).

[6] William Rich and Eugene Wood, Program Planning Guide in Agricultural Production, (Southern Illinois University, Carbondale 1975).

[7] Lindley John Hoyt, "Competencies in Livestock Marketing Needed by Farmers," (Masters Thesis, Iowa State University, Ames, 1968).

[8] Robert E. Spillman and Herbert Bruce Jr. "V-TECS: The Push to Competency Based Curriculum," American Vocational Journal, (September, 1976), p. 30.

[9] Herbert Bruce Jr. and Bruce Carpenter, "Competency-Based Curriculum, Kentucky Model," American Vocational Journal, (January, 1977), p. 58.

Bonner and Brown reported on a Mississippi Study of Competencies needed by FFA advisors. There were several competencies which were adapted to this survey.[10]

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[10] Jimmy Bonner and Ronald A. Brown, "Competencies Needed by Future Farmers of America Advisors," The Agricultural Education Magazine (February, 1977), p. 186.

CHAPTER III
RESULTS OF THE SURVEY

METHODOLOGY

A competency survey instrument was developed containing five cluster areas, 79 duty groups, and 1180 tasks. The instrument was validated by vocational, technical and adult education agriculture instructors with appropriate subject matter expertise. A Likert-type scale was used to obtain a mean value.

Two district sample populations were obtained to measure criticality. The first sample involved 145 individuals representing 80 farm operations in southwest Wisconsin. This group is labelled as the "Southwest" sample. These participants were nominated by local high school agriculture instructors. They met on the campus of the institute to complete the survey instrument.

The "Statewide" sample was obtained by agriculture instructors in the Wisconsin Vocational, Technical and Adult system. Includes persons from throughout the state but does not include persons in the "Southwest" sample. This sample supplied data from 57 Dairy, 34 Livestock Production, 51 Crop Production, 42 Agricultural Mechanics, and 49 Farm Business Management participants.

To measure performance levels, a survey was developed based on the amount of outside or off-the-farm assistance needed to complete the duty. This sample involved 24 farm operators in southwest Wisconsin. All responses were summarized by computer to obtain mean values for each duty area.

PROFILE OF PARTICIPANTS

A profile of the participants in the criticality (Phase I) sample was prepared from information supplied by 75 farm operators in southwest Wisconsin. A profile of the participants in the performance level (PHase II) study was not undertaken.

Dairy herd size as reported by the "Southwest" sample ranged from 20 through 180 milk cows (Table 3). The average herd size was 62.4 cows. Eighteen participants, 24.32 percent, milked herds with 25 to 49 cows. Slightly more than one-fourth of the group~~s~~, 25.68 percent, milked from 50 to 74 cows.

TABLE 3

DAIRY COW HERD SIZE OF COMPETENCY SURVEY PARTICIPANTS

Cow Herd Size	Number	Percent
None	15	20.27
24 or less	3	4.05
25 to 49	18	24.32
50 to 74	19	25.68
75 to 99	12	16.22
100 or more	7	9.46
TOTAL	74	100.00

Average Herd . . . . 62.4 cows
Smallest Herd . . . . 20.0 cows
Largest Herd . . . . .180.0 cows

Livestock producers who participated in this survey included swine producers, beef feeders and cow-calf operators. Thirty-seven of the 74 participants (50.0%) who supplied information were swine producers; forty-eight, 64.85 percent, were beef feeders; and twenty-eight, 37.83 percent, had cow-calf operations. Table 4 indicates the range in size of livestock operations reported by participants.

TABLE 4

LIVESTOCK NUMBERS MANAGED BY COMPETENCY SURVEY PARTICIPANTS

Livestock	Sows		Beef Feeders		Beef Cows	
Numbers	Number	Percent	Number	Percent	Number	Percent
None	37	50.0	26	35.4	46	62.16
20 or less	16	21.62	10	13.51	10	13.51
21 to 40	10	13.51	8	10.81	7	9.46
41 to 60	6	8.10	11	14.86	5	6.76
61 to 80	1	1.35	2	2.70	1	1.35
81 to 100	0	0.00	2	2.70	1	1.35
101 to 200	2	2.70	7	9.46	3	4.05
201 to 300	0	0.00	6	8.10	1	1.35
over 300	2	2.70	2	2.70	0	0.00
TOTAL	74	99.98	74	99.98	74	99.99
AVERAGE	57.62		98.67		53.86	

ANALYSIS OF DATA

CRITICALITY STUDY

A correlation analysis was conducted on data, from the two research populations, for each duty cluster. The Spearman rank order coefficient of correlation method was utilized. The rho coefficient of correlation for each cluster is:

Dairy Production	+.9631
Livestock Production	+.9996
Crop Production	+.9955
Agricultural Mechanics	+.9988
Farm Business Management	+.9626

IMPORTANCE OF COMPETENCIES

Data on the importance of duties and tasks are presented for each of the five clusters. Results of the two survey groups are reported to facilitate comparison of mean values. The number of responses recorded by each sample group are indicated.

The "Southwest" group responses were further divided to show how many responses were indicated for each of the five levels of importance.

Dairy Cluster

Responses to the Dairy Cluster survey ranked the fourteen duties by mean values. The following rank order for DUTY AREAS was determined by the "Southwest" sample. The "Southwest" sample mean is listed in parenthesis followed by the "Statewide" sample rank and mean.

RANK ORDER

1 Maintaining dairy herd health (4.75), 3-(4.52)

2 Milking cows (4.74), 1-(4.66)

3 Selecting breeding cows and replacement stock (4.56), 5-(4.43)

4 Breeding cows and heifers (4.54), 2-(4.55)

5 Formulating rations and feeding dairy cattle (4.50), 4-(4.50)

6 Handling and caring for dairy cattle (4.44), 6-(3.56)

7 Sanitizing and maintaining milking equipment (4.40), 7-(4.33)

8 Observing legal requirements in dairy operations (4.29), 9-(3.70)

9 Marketing dairy production and dairy cattle (4.21), 12-(3.49)

10 Maintaining dairy buildings and structures (may include planning and construction) (4.06), 10-(3.56)

11 Follow general safety practices (3.96), 8-(3.75)

12 Assembling and installing dairy operation equipment (3.93), 13-(3.41)

13 Handling and utilizing animal wastes (3.83), 11-(3.51)

14 Fit and show dairy cattle (2.77), 14-(2.12)

The ten tasks which ranked the highest in the "Southwest" sample are listed with their mean value in parenthesis, followed by the "Statewide" rank and mean.

DUTY	TASK	
13	3	Store chemicals away from feed, animals, and children (4.69), 2-(4.54)
3	2	Determine when to breed (4.67), 1-(4.56)
1	3	Determine when additives should be withdrawn from animals (4.60), 9-(4.29)
3	1	Determine the onset of the heat period (estrus) (4.60), 3-(4.48)
1	1	Follow laws relating to chemical use (4.58), ?-(4.07)
2	12	Select foundation stock for production and type (4.50), 8-(4.30)
10	9	Determine when cow is milked out (4.48), 7-(4.33)
3	4	Identify various causes of breeding difficulty (4.47), ?-(4.16)
10	5	Stimulate milk let-down effect (4.45), 6-(4.33)
1	2	Interpret feed additive mixing regulations (4.44), ?-(4.00)

The statewide sample ranked, 9-1 "Adjust vacuum", and 9-5 "Replace inflations" number 4 and 5 respectively.

Complete results, for the two survey groups, by duty area and task follows:

TABLE 5

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS: DAIRY CLUSTER
U.S.O.E. Code 01.01 01 00 00 DOT Code 413.131

The duties and tasks represented in this listing may be necessary or significantly desirable for beginning farm operators who will strive for success and advancement in dairy production.

						SOUTHWEST		STATEWIDE	
						N=80		N=57	
	OF NO IMPORTANCE	OF LOW IMPORTANCE	OF MEDIUM IMPORTANCE	OF HIGH IMPORTANCE	OF EXTREME IMPORTANCE	TOTAL RESPONSES	MEAN	TOTAL RESPONSES	MEAN
DUTY AREAS									
1. Observing legal requirements in dairy operations	0	0	6	32	24	87	4.29	55	3.70
2. Selecting breeding cows and replacement stock	0	0	2	23	37	62	4.56	57	4.43
3. Breeding cows and heifers	0	0	5	18	38	61	4.54	56	4.55
4. Formulating rations & feeding dairy cattle	0	0	5	21	36	62	4.50	56	4.50
5. Maintaining dairy herd health	0	0	0	15	47	62	4.75	55	4.52
6. Maintaining dairy buildings & structures (may include planning & construction)	0	0	10	38	14	62	4.06	53	3.56
7. Handling & caring for dairy cattle	0	0	2	30	29	61	4.44	57	4.35
8. Assembling & installing dairy operation equipment	0	2	17	24	17	60	3.93	55	3.41
9. Sanitizing & maintaining milking equipment	0	0	4	29	29	62	4.40	56	4.33
10. Milking cows	0	0	3	10	49	62	4.74	57	4.66
11. Handling & utilizing animal wastes	1	1	17	34	9	61	3.83	51	3.51
12. Marketing dairy production & dairy cattle	0	0	9	30	22	61	4.21	55	3.49
13. Follow general safety practices	0	0	15	35	13	63	3.96	55	3.75
14. Fit & show dairy cattle	7	15	29	7	4	62	2.77	56	2.12

TASKS									
1. Observing Legal Requirements in Dairy Operations									
Follow laws relating to chemical use	0	0	3	20	39	62	4.58	52	4.07
Interpret feed additive mixing regulations	0	0	7	20	34	61	4.44	54	4.00
Determine when additives should be withdrawn from animals	0	0	3	18	39	60	4.60	54	4.29
Interpret milk production standards	0	0	6	35	20	61	4.22	54	3.83
Identify EPA, DNR & Wisconsin Dept. of Agriculture regulations which apply to dairy operations	1	2	10	35	14	62	3.95	53	3.20
2. Selecting Breeding Cows & Replacement Stock									
Determine age of animals	0	1	19	33	9	63	3.80	55	3.50
Establish production goals for culling purposes	0	0	7	35	20	62	4.20	56	4.01
Evaluate advantages of various breeds	0	1	25	28	8	62	3.69	56	2.94
Evaluate general condition of animals	0	0	8	39	15	62	4.11	55	3.70
Evaluate overall performance & health records of animals	0	0	2	40	20	62	4.29	56	3.63
Evaluate the degree various traits & characteristics are inherited	0	0	21	31	8	60	3.78	52	3.59
Identify parts of animals	1	2	32	25	2	62	3.40	56	3.00
Identify reputable sources for obtaining stock	0	1	18	34	9	62	3.82	55	3.36
Inspect animals for defects	0	0	9	39	13	61	4.06	55	3.83
Inspect animals for desirable traits & characteristics	0	0	7	37	17	61	4.16	53	3.92
Select breeding system to follow	0	0	4	30	28	62	4.38	55	4.20
Select foundation stock for production & type	0	1	3	21	36	61	4.50	55	4.30
Evaluate advantages of raising replacements vs. buying replacements	0	0	14	33	15	62	4.01	54	3.88
Identify breeds	3	9	26	13	7	58	3.20	51	2.84
3. Breeding Cows & Heifers									
Determine the onset of the heat period	0	0	1	22	38	61	4.60	54	4.48
Determine when to breed	0	0	0	20	41	61	4.67	55	4.56

Calculate due date for animals	0	0	6	30	25	61	4.31	55	3.96
Identify various causes of breeding difficulty	0	0	1	30	30	61	4.47	55	4.16
Select a breeding method	0	1	9	26	25	61	4.22	55	3.98
Pregnancy test animals	0	2	15	28	15	60	3.93	55	3.83
Store and prepare semen	6	7	19	7	21	60	3.50	55	3.07
Artificially inseminate animals	3	6	17	20	15	61	3.62	55	3.52
Identify & explain function of reproductive organs	1	5	27	17	11	61	3.52	54	3.33
Evaluate sire trait information & select for desired improvements	0	0	7	21	33	61	4.42	54	4.07
Record & utilize reproduction records	0	0	1	24	21	46	4.43	40	4.27
4. Formulating Feeds & Feeding Dairy Cattle									
Develop rations	0	0	6	30	27	63	4.33	54	4.14
Calculate cost of rations & feed mixtures	0	0	8	31	24	63	4.25	55	4.14
Calculate feed efficiency	0	0	11	31	21	63	4.15	55	3.98
Classify feeds	0	2	24	32	5	63	3.63	52	3.46
Determine amount of feed additives to add to mixtures	0	0	7	35	21	63	4.22	53	4.01
Determine amount to feed per animal	0	0	4	36	22	62	4.29	55	4.12
Determine appropriate form for preparing feed	1	2	14	39	7	63	3.77	55	3.76
Substitute for various feedstuffs in rations	0	1	20	32	9	62	3.79	55	3.76
Determine nutrient level requirements for animals	0	1	7	34	21	63	4.19	55	4.21
Determine purpose of various classes of feedstuffs in rations & mixtures	0	2	15	37	9	63	3.84	55	3.69
Determine why various nutrients are needed in rations & mixtures	1	1	14	32	15	63	3.93	55	3.85
Determine total amount of feed needed for herds	0	2	9	41	11	63	3.96	55	3.96
Determine water requirements for animals	0	6	18	27	11	63	3.69	54	3.38
Determine amount of milk or replacer to feed	0	1	11	34	16	62	4.04	54	3.75
Feed calves from buckets	6	4	25	23	3	61	3.21	55	3.36
Identify moldy or spoiled feedstuffs	1	2	13	29	17	62	3.95	54	3.81
Determine what rations & mixtures should be changed	0	2	8	37	15	62	4.04	54	4.03
Determine which feeds & additives may be included in animal feed mixtures	0	0	9	40	13	62	4.06	55	3.94

Determine which feedstuffs & amount of feedstuffs may be substituted in rations	0	0	16	38	8	62	3.87	55	3.85
Evaluate the influence the quality of feedstuffs has on production	0	0	7	35	20	62	4.20	55	4.05
Evaluate how ration imbalance may affect production	0	1	4	32	25	62	4.30	55	4.05
Evaluate influence residus in milk have on marketing problems	0	1	6	22	31	60	4.38	55	4.21
Identify factors that influence feed requirements & feed efficiency	0	2	10	32	18	62	4.06	55	3.83
Identify factors that influence quality of feedstuffs	0	0	18	29	15	62	3.95	55	4.01
Determine purpose of various nutrients in rations & mixtures	0	1	14	37	10	62	3.90	55	3.80
Evaluate the influence the digestive systems has on feedstuffs that may be fed	0	4	17	31	10	62	3.75	55	3.81
Interpret feed analysis reports	0	3	14	31	14	62	3.90	55	3.89
Interpret feed tags & labels	0	3	9	34	16	62	4.01	55	3.78
Interpret feeding charts & tables	0	3	11	31	17	62	4.00	55	3.81
Select appropriate feeding methods	0	3	10	36	12	61	3.93	55	4.01
Determine how feed palatability may be improved	0	2	14	34	11	61	3.88	55	4.00
Work with veterinarian & feed salesman in formulating feeds & planning feeding programs	0	3	12	24	23	62	4.08	55	3.87
Identify essential nutrients needed in rations & mixtures	0	1	12	28	21	62	4.11	54	4.03
Evaluate how feed additives influence production & efficiency	0	1	11	34	15	61	4.03	54	3.85
Determine amount of weight animals should gain	0	3	18	35	6	62	3.70	55	3.40
Fill feed troughs & bunks	2	10	20	24	5	61	3.32	55	3.07
Fill & clean waters	1	6	15	24	16	62	3.77	55	3.34
Prepare feed mixtures	0	3	14	31	14	62	3.90	55	3.70
Flush animals	4	9	25	21	3	62	3.16	55	2.92
Precondition animals for shipping	1	11	24	22	4	62	3.27	55	2.96
Evaluate influence of using pasture on feeding requirements	0	4	23	26	6	60	3.53	55	3.49
Wean animals	0	7	22	28	5	62	3.50	55	3.43
Precondition animals for feedlot	2	7	23	22	7	61	3.40	55	3.09

Evaluate affect of various feeding practices on carcass composition & feed efficiency	2	8	22	26	4	62	3.35	55	3.10
Prepare milk replacer solution for calves	2	3	23	23	11	62	3.61	54	3.57
Determine when calves may be started on grain & roughages	0	2	22	28	10	62	3.74	54	3.70
Lead feed producing cows	0	1	17	29	15	62	3.93	54	3.79
Determine when cows may be turned out to pasture	2	3	31	24	2	62	3.33	54	3.11
Precondition cattle before turning out to pasture	5	5	34	18	0	62	3.04	55	3.12
Determine when dairy cattle should be removed from pasture	2	7	23	23	6	61	3.39	55	3.14
Replace salt & mineral blocks	2	3	15	24	18	62	3.85	55	3.80
Calculate & feed rations for lactating cows	1	0	3	32	26	62	4.32	55	4.23
Calculate & feed rations for dry cows	1	1	7	33	20	62	4.12	55	3.89
Calculate & feed rations for cows just before & after calving	1	0	5	30	26	62	4.29	55	4.09
Calculate & feed rations for calves from weaning to six months of age	0	0	13	32	17	62	4.06	55	3.85
Calculate & feed ration for heifers from six months of age to freshening	0	3	13	32	14	62	3.91	55	3.76
Operate automatic feed handling equipment	0	7	25	21	8	61	3.49	55	3.20
Correlate feeding to DHI production records	0	2	11	29	20	62	4.08	55	4.00
5. Maintaining Dairy Herd Health									
Evaluate influence health has on production	0	2	6	26	27	61	4.27	54	4.16
Identify common livestock internal & external parasites	1	3	11	38	9	62	3.82	55	3.78
Identify sanitation problems which may affect herd health	0	2	8	30	22	62	4.16	55	4.10
Identify symptoms of nutritional imbalance	0	2	9	31	20	62	4.11	54	4.09
Select materials to control internal & external parasites	0	3	11	38	10	62	3.88	55	3.87
Work with veterinarians in developing herd health program	0	2	3	33	23	61	4.26	55	4.14
Disinfect & whitewash buildings & equipment	0	5	17	24	15	61	3.80	53	3.66
Select proper chemicals to clean buildings & equipment	0	3	21	23	14	61	3.78	55	3.74
Use insecticide repellents in buildings	0	4	20	28	10	62	3.70	55	3.67
Apply insecticides to cattle to control external parasites	0	2	14	35	11	62	3.88	55	3.78

Identify symptoms of common cattle diseases	0	2	6	35	19	62	4.14	54	4.09
Identify symptoms of major dairy cattle parasites	0	2	8	36	16	62	4.06	55	3.96
Evaluate life cycles of parasites to determine control procedures	0	6	17	32	6	61	3.62	55	3.54
Calculate cost of treatments	0	7	25	27	3	62	3.41	54	3.38
Supply medication through feed & water	0	7	18	31	6	62	3.58	52	3.50
Isolate animals with transmissible diseases	0	4	10	20	28	62	4.16	54	4.12
Select appropriate method to control diseases	0	3	7	37	15	62	4.03	54	4.14
Worm animals	0	1	13	33	15	62	4.00	54	3.81
Vaccinate animals	0	1	8	26	27	62	4.27	54	4.14
Determine amount of medication or materials needed in specific situations	0	2	11	35	14	62	3.98	54	4.00
Interpret labels on medications & insecticide containers	0	2	7	29	24	62	4.20	54	4.16
Give intra-muscular injections	0	3	21	28	9	61	3.70	53	3.69
Determine when to rotate pastures to control diseases & parasites	1	7	23	29	2	62	3.38	54	3.24
Observe new animals for symptoms of diseases & parasites	0	2	12	27	21	62	4.08	54	3.88
Determine when the veterinarian should be called	0	2	7	23	30	62	4.30	54	4.37
Apply medication to cuts & bruises	1	1	18	29	13	62	3.83	54	3.85
Identify & isolate injured animals	1	1	14	32	14	62	3.91	54	3.90
Blood test cows	2	8	28	20	4	62	3.25	53	3.24
Inspect udders for mastitis & bruises, cuts & bumps	0	2	4	25	31	62	4.37	53	4.24
Place magnet in animals stomach	1	8	29	19	5	62	3.30	52	3.51
Performed approved mastitis test	0	2	20	27	11	61	3.73	53	3.94
Treat udders with veterinarian prescribed medications	0	1	12	25	22	60	4.13	52	4.15
6. Maintaining Dairy Buildings & Structures Planning & Construction									
Apply wood & metal preservatives	0	12	24	22	4	62	3.29	53	3.30
Clean & oil electric motors on structures	1	2	15	33	11	62	3.28	54	3.74
Build & remove concrete forms	1	16	30	14	1	62	2.96	54	3.01
Determine cost of repairs	1	4	26	29	1	61	3.40	54	3.77
Develop bill of materials needed for repairs	0	7	27	27	1	62	3.35	54	3.46

Repair & hang gates & doors	0	5	25	25	7	62	3.54	54	3.48
Install electric motors	0	9	26	22	5	62	3.37	54	3.29
Lay blocks	6	19	31	5	1	62	2.61	54	2.66
Mix, pur, finish & cure concrete	4	16	29	10	3	62	2.87	54	2.94
Read & interpret blueprints	5	17	22	15	1	60	2.83	54	3.03
Install & repair bracing in buildings & structures	2	4	31	18	6	61	3.36	52	3.53
Repair electrical cords & broken wires	1	4	13	27	16	61	3.86	54	3.87
Repair minor leaks in roof of buildings	1	2	25	23	10	61	3.63	54	3.53
Replace belts & pulleys	0	6	17	32	6	61	3.62	54	3.62
Reset circuit breakers	2	8	12	25	14	61	3.67	54	3.62
Replace electrical switches	0	8	21	25	7	61	3.50	54	3.64
Replace fuses	1	9	13	23	15	61	3.68	54	3.66
Replace lighting fixtures	1	10	17	29	4	61	3.40	54	3.59
Install & replace valves in water system	1	7	19	29	5	61	3.49	54	3.55
Install & repair faucets	0	8	24	23	6	61	3.44	54	3.48
Replace water pipe	1	15	21	20	4	61	3.18	54	3.50
Replace window panes	1	10	22	21	5	59	3.32	54	3.37
Construct & repair fences & gates	0	5	13	30	13	61	3.83	54	3.62
Wire simple electrical circuit	1	7	19	25	8	60	3.53	54	3.18
Install & repair wood siding on buildings & structures	2	11	29	17	2	61	3.09	54	2.92
Repair metal structures with arc & oxy-acetylene welder	4	14	21	19	2	60	3.01	54	2.83
Determine size of building needed for cattle	0	8	13	31	9	61	3.67	54	3.79
Evaluate ventilation systems for livestock number & building size	0	10	10	28	11	59	3.67	54	3.51
Control humidity & temperature in housing unit	0	3	9	32	17	61	4.03	54	4.11
Determine capital requirements for alterations or improvements in dairy buildings	1	5	8	28	12	54	3.83	53	3.83
7. Handling & Caring for Animals									
Assist animals in delivering young	0	1	9	20	31	61	4.32	56	4.26
Castrate animals	0	3	17	22	19	61	3.93	55	3.36
Check animals milk supply	0	0	10	35	16	61	4.09	56	3.91
Clean newborn animals	1	5	18	28	9	61	3.63	56	3.78
Dehorn animals	0	4	18	24	15	61	3.81	56	3.85
Determine space needed for animals	1	2	12	30	15	60	3.93	56	3.87

Disinfect & clip naval cord	0	2	12	29	18	61	4.03	56	3.73
Evaluate influence of stress on growth & condition of animals	0	5	9	37	10	61	3.85	56	3.66
Exercise animals	0	9	17	27	8	61	3.55	56	3.67
Help young to nurse	0	2	7	27	25	61	4.22	55	3.81
Identify signs of approaching birth	0	0	6	26	29	61	4.37	55	4.21
Identify due dates for/animals	0	2	5	29	25	61	4.26	55	4.10
Isolate newly purchased animals for observation	0	2	12	28	19	61	4.04	54	3.81
Mark animals for identification & keep ID records	0	3	4	31	23	61	4.21	55	4.03
Move cows to calving pends	0	4	9	23	25	61	4.13	55	3.96
Move calves to nurse cows	5	7	19	19	10	60	3.36	54	3.16
Observe animals regularly	0	1	11	21	28	61	4.24	54	4.14
Pen animals according to size, weight, & sex	0	1	10	31	19	61	4.11	53	3.73
Remove afterbirth	2	5	16	20	18	61	3.77	54	3.53
Remove non-compatible animals	0	1	22	21	17	61	3.88	55	3.65
Trim hoofs	0	2	29	20	10	61	3.62	55	3.25
Weigh animals	3	13	32	11	1	60	2.90	54	2.53
Regulate air movement & temperature in housing for dairy cattle	0	3	10	28	19	60	4.05	55	3.92
House springing heifers with the milking herd	2	7	21	23	8	61	3.45	55	3.32
Restrain cows with ropes or hobbles	7	14	22	16	2	61	2.86	52	2.82
Remove milking cows to holding pen or area	3	11	27	15	4	60	3.10	54	3.05
Clip dairy cattle	3	8	22	20	8	61	3.36	55	3.40
Determine length of dry period	2	1	15	29	14	61	3.85	55	3.60
Milk fresh cows by hand	18	13	16	12	2	61	2.45	55	2.65
Remove excess teats from heifers	3	9	13	31	5	61	3.42	55	3.40
Clean animals with brush & comb	1	17	29	11	3	61	2.96	55	2.85
Bed animals	1	2	14	28	16	61	3.91	55	3.65
Check udders on heifers & cows	0	2	9	32	17	60	4.06	55	3.89
Prevent animals from stampeding	2	8	18	16	12	56	3.50	51	3.37
8. Assembling & Installing Dairy Operations Equipment									
Observe safety precautions with all equipment	0	1	6	30	23	60	4.25	51	3.98
Use operators manual to mantain materials handling equipment	1	3	10	33	13	60	3.90	55	3.92
Lubricate equipment	1	1	9	29	19	59	4.08	55	4.23
Adjust belts on equipment	1	0	16	32	10	59	3.84	55	4.03
Adjust chains on equipment	1	1	14	30	13	59	3.89	55	4.00

Adjust controls on equipment	2	0	14	27	16	59	3.93	55	3.90
Adjust safety shields on equipment	1	1	8	28	21	59	4.13	55	4.14
Check for missing equipment parts or hardware	0	2	17	29	10	58	3.81	55	3.81
Follow written assembly instructions	2	3	9	24	11	59	3.83	55	3.83
Identify hardware	1	6	22	26	3	58	3.41	55	3.56
Inspect equipment for operating defects	0	2	19	30	8	59	3.74	55	3.98
Install equipment in proper places	1	5	15	28	10	59	3.69	55	3.80
Interpret assembly diagrams	2	7	23	23	4	59	3.33	55	3.54
Interpret assembly instructions	3	6	16	30	4	59	3.44	55	3.67
Use proper equipment & tools to assemble & install equipment	2	6	14	31	3	56	3.48	55	3.72
9. Sanitizing & Maintaining Milking Equipment									
Adjust vacuum	1	2	2	21	36	62	4.43	55	4.43
Check coolers & water heaters	2	3	4	27	26	62	4.16	55	4.16
Clean pulsators	1	1	4	27	29	62	4.32	55	4.18
Remove milkstone	1	0	3	25	33	62	4.43	55	4.40
Replace inflations	1	0	5	23	33	62	4.40	54	4.42
Replace rings on milker heads	2	2	6	30	21	61	4.08	53	4.05
Replace teat cup liners	1	2	3	23	31	60	4.35	54	4.38
Select proper cleaning agents & prepare for use	1	2	9	27	23	62	4.11	55	4.25
Set automatic timers	4	3	15	32	7	61	3.57	55	3.80
Prepare automatic equipment for cleaning and/or sanitizing cycle	3	2	10	27	19	61	3.93	55	3.89
Assemble & sanitize milking system	1	3	7	28	22	61	4.09	55	4.16
10. Milking cows									
Read & follow directions for make & type of milking equipment available	2	0	11	30	17	60	4.00	53	3.90
Identify lactating cows	0	3	9	28	22	62	4.11	56	4.00
Establish & follow milking schedule	0	1	5	28	25	62	4.33	56	4.26
Wash & dry udders	1	0	4	33	24	62	4.27	56	4.19
Stimulate milk let-down effect	0	1	4	23	34	62	4.45	56	4.33
Use strip cup to check for abnormal milk	1	5	15	26	15	62	3.79	56	3.75
Attach & adjust milking machine	0	1	4	30	27	62	4.33	56	4.16
Set or operate automatic take off units	4	5	19	18	14	60	3.55	56	3.46

Determine when cow is milked out	0	2	2	22	36	62	4.48	56	4.33
Machine strip if required	1	2	9	32	18	62	4.03	56	3.94
Remove milker in proper manner	0	2	3	26	31	62	4.38	55	4.27
Dip teat ends with approved disinfectant	0	5	7	24	26	62	4.14	56	4.21
Sanitize teat cups in approved manner	0	3	13	21	25	62	4.09	56	3.76
Dry off cows at end of lactation	1	3	4	30	24	62	4.17	56	4.17
Determine when milk is at proper temperature for shipping	0	5	16	20	20	61	3.90	54	3.64
Train fresh heifers to be machine milked	0	5	6	30	21	62	4.08	55	4.07
11. Handling & Disposing of Animal Wastes									
Evaluate animal waste management alternatives	1	3	24	29	4	61	3.52	51	3.52
Prevent waste runoff from feedlots & housing quarters	1	1	18	31	10	61	3.78	52	3.61
Dispose of dead animals properly	2	1	9	16	33	61	4.26	53	4.05
Remove manure from pens & quarters	3	2	9	24	23	61	4.01	53	3.79
Spread manure on fields when bare or unfrozen	2	5	23	19	12	61	3.55	53	3.50
Determine need for & participate in development of regulatory controls	3	3	25	23	7	61	3.45	53	3.33
Operate waste disposal system to maintain health of operator & livestock	0	2	18	29	12	61	3.83	53	3.69
12. Marketing & Shipping Dairy Products & Dairy Cattle									
Identify all information on milk payroll statement	1	0	14	27	19	61	4.03	53	4.01
Calculate expected returns & profits on sales	0	3	10	34	14	61	3.96	55	3.98
Evaluate influence of market grade or class on returns	0	3	17	31	10	61	3.78	55	3.81
Load animals	4	7	21	18	10	60	3.38	55	3.14
Prepare truck for hauling animals	4	9	17	23	8	61	3.36	55	3.09
Select markets	1	3	15	30	11	60	3.78	55	3.63
Prepare advertising announcement for selling animals	4	10	19	21	5	59	3.22	55	3.23
Interpret market reports	0	6	15	34	5	60	3.63	53	3.69
Analyze market cycles	2	4	20	32	3	61	3.49	54	3.33
Select appropriate marketing system for milk	0	2	16	31	12	61	3.86	54	3.81
Select truckers	4	8	21	21	7	61	3.31	54	3.03

Determine affect middlemen & retailers have on producers' prices	2	5	24	20	10	61	3.50	54	3.20
Determine whether animals should be held over for another year's income	0	2	11	30	17	60	4.03	53	3.83
Estimate market grades	1	3	24	31	2	61	3.49	54	3.38
Develop plan to spread marketing throughout year	1	4	23	27	6	61	3.54	54	3.59
Determine the affect milk substitutes have on prices & demands	4	2	22	22	10	60	3.53	54	3.46
Take pictures of animals for advertising announcements	6	8	26	15	5	60	3.08	54	3.90
Determine when calves are ready to market	0	3	25	28	5	61	3.57	54	3.48
Determine number of animals to load on trucks	2	12	14	28	5	61	3.36	54	3.12
Consign outstanding individuals at sales	5	8	19	21	7	60	3.28	54	3.20
Determine base butterfat test	1	3	22	27	8	61	3.62	53	3.56
Compare milk hauling expenses of companies	3	9	21	26	2	61	3.24	54	3.40
Compare company base milk prices & differential prices for butterfat differences	1	3	15	25	16	60	3.86	54	3.81
Read measuring stick on bulk tank	0	7	19	20	14	60	3.68	53	3.67
Participate in milk marketing policy decision making organizations	0	4	20	23	12	59	3.72	51	3.72
13. Following General Safety Precautions									
Follow safe work habits	0	1	8	32	22	63	4.19	54	4.16
Identify potential safety hazards	0	0	7	29	26	62	4.30	55	4.12
Store chemicals away from feed, animals & children	0	0	4	11	48	63	4.69	55	4.54
Use fire extinguishers	1	2	11	26	23	63	4.07	55	4.25
Wear appropriate protective clothing	1	1	16	33	12	63	3.85	55	4.10
Ventilate work areas & manure pits	1	0	7	31	24	63	4.22	55	4.23
Interpret information on labels & signs	0	1	11	27	24	63	4.17	55	4.23
Use proper lifting & carrying methods	0	1	17	28	17	63	3.96	55	3.89
Store inflammable materials	0	1	15	23	24	63	4.11	55	4.14
Wear appropriate work cloths	1	3	14	28	17	63	3.90	55	3.87
Adjust safety devices	0	2	14	24	23	63	4.07	55	4.09
Install safety devices	0	2	14	25	22	63	4.06	55	4.09
Determine when climatic conditions provide unsafe work situations	2	0	12	34	15	63	3.95	55	3.87

	Correct potential safety hazards	0	1	12	29	21	63	4.11	55	4.16
	Remove debris from work areas	2	2	13	31	15	63	3.87	55	4.00
	Use electrical connectors & safety devices	0	2	11	26	24	63	4.14	55	4.12
	Dispose of chemical containers	1	0	9	20	32	62	4.32	55	4.20
14.	Fit & Showing Dairy Cattle									
	Train animals for showing	5	14	21	12	7	59	3.03	55	2.89
	Fit animals for showing	6	14	22	10	7	59	2.96	55	2.83
	Register animals for exhibition	6	15	19	10	9	59	3.01	55	2.89
	Observe health regulations for show cattle	6	10	18	10	15	59	3.30	55	3.29
	Show animals	7	12	22	9	9	59	3.01	54	2.70

Livestock Production Cluster

The Livestock Production duty areas are listed in rank order as determined by the "Southwest" mean value (in parenthesis) followed by the "Statewide" sample rank and mean. The most important duties in the Livestock Production Cluster are:

RANK ORDER

1 Maintain hog herd health (4.60), 1-(4.55)

2 Selecting swine breeding or feeder stock (4.31), 6-(4.23)

3 Handling and caring for animals (4.30), 8-(4.15)

4 Selecting beef breeding or feeder cattle (4.26), 5-(4.24)

5 Formulating feeds and feeding hogs (4.25), 8-(4.15)

6 Breeding sows and gilts (4.24), 3-(4.32)

(tie for 7th place)

7 Planning and feeding for economic gains (4.15), 2-(4.39)

7 Observing legal practices for economic gains (4.15), 12-(3.96)

9 Marketing and shipping hogs (4.13), 11-(4.09)

10 Breeding beef cows and heifers (4.12), 4-(4.31)

(tie for 11th place)

11 Handling and treating beef cattle (3.97), 10-(4.10)

11 Marketing and shipping beef cattle (3.97), 7-(4.17)

13 Maintaining swine buildings and equipment (3.93), 15-(3.51)

14 Disposing of animal waste (swine) (3.75), 13-(3.56)

15 Maintaining beef cattle buildings and equipment (3.57), 14-(3.53)

The top five ranked tasks in the swine production and beef production areas are listed separately. The top ranked tasks in swine production are:

DUTY	TASK	
5	18	Observe animals regularly (4.47), 1-(4.15)
6	3	Remove dead animals (4.44), 1-(4.45)
3	20	Determine when feed additives should be withdrawn from animals (4.43), 5-(4.38)
3	1	Provide clean and adequate water supply (4.40), 1-(4.45)
4	18	Isolate animals with transmissible disease (4.38), 1-(4.45)

The most essential tasks for beef producers are determined to be:

DUTY	TASK	
12	13	Supply water requirements for animals (4.43) ?-(4.14)
11	15	Observe animals regularly (4.36), 4-(4.35)
12	15	Determine when feed additives must be withdrawn from animals (4.32), 2-(4.39)
15	1	Follow FDA laws related to chemical use and disposal (4.30), 2-(4.39)
15	2	Interpret feed additive withdrawal laws and regulations (4.30), 1-(4.46)

Complete results, for the two survey groups, by duty area and task follows:

TABLE 6

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS: LIVESTOCK PRODUCTION CLUSTER
U.S.O.E. Code 01.01 01 01 04, 01.01 01 01 02 DOT Code - Swine Producer 413.181
Beef Producer 413.181

Knowledge of and skills in meat animal production may provide a profitable method of marketing feed grains also forages from land not suitable or economical for machine harvest.

						SOUTHWEST		STATEWIDE	
	OF NO IMPORTANCE	OF LOW IMPORTANCE	OF MEDIUM IMPORTANCE	OF HIGH IMPORTANCE	OF EXTREME IMPORTANCE	N=80 TOTAL RESPONSES	MEAN	N=34 TOTAL RESPONSES	MEAN
DUTY AREAS									
1. Selecting swine breeding or feeder stock	1	0	5	16	22	44	4.31	30	4.23
2. Breeding sows & gilts	1	1	3	21	19	45	4.24	31	4.32
3. Formulating feeds & feeding hogs	0	0	1	31	12	44	4.25	32	4.15
4. Maintaining hog herd health	0	0	2	14	29	45	4.60	34	4.55
5. Handling and caring for animals	0	0	3	26	17	46	4.30	32	4.15
6. Disposing of animals waste (swine)	0	1	13	27	4	45	3.75	32	3.56
7. Maintain swine building & equipment	0	0	10	27	7	44	3.93	31	3.51
8. Marketing & shipping hogs	0	0	11	17	17	45	4.13	31	4.09
9. Selecting beef breeding or feeder cattle	2	0	3	16	20	41	4.26	29	4.24
10. Breeding beef cows & heifers	2	0	4	20	15	41	4.12	29	4.31
11. Handling & treating beef cattle	3	0	3	23	11	40	3.97	29	4.10
12. Planning & feeding for economic gains	2	1	2	19	16	40	4.15	28	4.39
13. Maintaining beef cattle buildings & equipment	2	0	11	24	1	38	3.57	28	3.53
14. Marketing & shipping beef cattle	2	0	8	17	13	40	3.97	28	4.17
15. Observing legal practices in meat production	0	0	10	14	16	40	4.15	29	3.96

TASKS									
1. Selecting Swine Breeding or Feeder Stock									
Identify major breeds of hogs & their advantages	0	1	1	19	8	43	3.79	29	3.37
Identify desirable characteristics of breeding & feeder animals	0	0	4	27	12	43	4.18	29	4.00
Evaluate breeding stock for type & performance testing data to determine those animals with superior performance	0	0	6	24	13	43	4.16	29	4.10
Evaluate animals for health, condition, & defects	0	0	5	18	20	43	4.34	29	4.37
Identify reputable sources for obtaining stock	0	0	8	18	17	43	4.20	29	4.00
Select breeding system to follow	0	0	8	20	15	43	4.16	29	4.03
Select feeder pigs for growth & health	2	1	2	18	19	42	4.21	29	4.34
2. Breeding Sows & Gilts									
Comprehend the basic physiological function of the reproductive organs	1	2	18	19	4	44	3.52	30	3.40
Identify causes of reproductive failure	0	2	6	27	10	45	4.00	30	4.03
Identify procedures to improve conception rate & live births	0	2	3	27	13	45	4.13	29	4.27
Determine number of boars needed for sow herd	0	1	9	21	14	45	4.06	30	4.00
Describe signs of heat (estrus)	0	2	7	21	14	45	4.08	30	3.90
Determine when to breed	0	0	7	21	17	45	4.22	30	4.03
Identify signs of approaching birth	0	0	3	22	20	45	4.37	30	4.26
3. Formulating Feeds & Feeding Hogs									
Provide clean & adequate water supply	0	1	4	15	24	44	4.40	31	4.45
Identify moldy or spoiled feed	0	2	9	17	16	44	4.06	31	4.25
Evaluate affect of various feeding practices on carcass composition & feed efficiency	0	0	13	19	12	44	3.97	31	3.87

Calculate & feed ration for hogs from 40# - 100#	0	0	8	20	16	44	4.18	31	4.00
Calculate & feed ration for feeder pigs over 100#	0	0	8	23	13	44	4.11	31	3.90
Calculate & feed ration for breeding stock over 100#	0	0	6	22	15	43	4.20	31	4.06
Calculate & feed ration for gestating gilts	0	0	5	22	17	44	4.27	31	4.22
Calculate & feed ration for gestating sows	0	0	5	21	18	44	4.29	31	4.19
Calculate & feed ration for boars	0	0	6	24	14	44	4.18	31	3.93
Calculate cost of rations & feed mixtures	0	0	10	16	18	44	4.18	31	4.09
Calculate feed efficiency	0	0	7	20	17	44	4.22	31	4.12
Classify feeds for nutrient sources	0	0	9	23	11	43	4.04	31	3.83
Determine amount of feed additives to add to mixtures	0	0	4	27	13	44	4.20	31	4.03
Determine amount to feed per animal	0	1	8	24	11	44	4.02	31	3.80
Determine appropriate form for preparing feed (grind vs pellet)	0	2	14	24	3	43	3.65	31	3.25
Determine nutrient level requirements for animals	0	1	8	25	10	44	4.00	31	3.93
Determine why various nutrients are needed in rations & mixtures	0	2	9	25	8	44	3.88	31	3.54
Determine relative nutritive value of feedstuffs	0	1	13	23	7	44	3.81	31	3.64
Determine total amount of feed needed for herds	0	2	8	27	7	44	3.88	31	4.00
Determine when feed additives should be withdrawn from animals	0	1	3	16	24	44	4.43	31	4.38
Determine when rations & mixtures should be changed	0	1	8	18	17	44	4.15	31	4.19
Determine which feeds & additives may be included in animal feed mixtures	0	1	9	22	11	43	4.00	31	3.93
Determine which feedstuffs & amount of feedstuffs which may be substituted in rations	0	1	15	20	7	43	3.76	31	3.67
Evaluate the influence the quality of feedstuffs has on production	0	0	10	26	8	44	3.95	31	3.83
Evaluate how ration imbalance may affect production & reproduction	0	1	7	25	11	44	4.04	31	4.00

Evaluate influence resides in meat have on marketing problems	0	0	9	19	16	44	4.15	31	3.83
Identify factors that influence feed requirements & feed efficiency	0	0	9	22	13	44	4.09	31	3.87
Determine purpose of various nutrients in rations & mixtures	0	0	11	25	8	44	3.93	31	3.83
Interpret feed analysis reports	0	1	13	21	9	44	3.86	31	3.83
Interpret feed tags & labels	0	2	9	20	12	43	3.97	31	4.09
Interpret feeding charts & tables	0	3	11	20	9	43	3.81	31	3.87
Select appropriate feeding methods	0	2	8	24	10	44	3.95	30	3.76
Determine how feed palatability may be improved	0	0	13	22	9	44	3.90	31	3.51
Work with veterinarian & feed salesman in formulating feeds & planning feeding program	0	3	12	17	12	44	3.86	31	3.80
Identify essential nutrients needed in rations & mixtures	0	1	7	27	9	44	4.00	31	3.96
Evaluate how feed additives influence production & efficiency	0	0	8	27	9	44	4.02	31	3.90
Determine amount of weight animals should gain	1	0	13	18	12	44	3.90	31	3.80
Fill feed troughs, bunks, & self feeders	1	3	10	13	13	40	3.85	29	3.75
4. Maintain Hog Herd Health									
Enforce no visitors around hogs	0	1	9	12	22	44	4.25	32	3.90
Identify precautions when using, storing or handling medicine & drugs	0	1	6	19	18	44	4.22	33	4.09
Evaluate influence animal health has on production	0	1	4	26	12	43	4.13	33	4.18
Identify common livestock internal & external parasites	0	0	8	25	10	43	4.04	33	4.18
Identify sanitation problems which may affect herd health	0	0	4	27	12	43	4.18	33	4.24
Identify symptoms of nutritional imbalance	0	0	12	22	9	43	3.93	33	4.21
Select materials to control internal & external parasites	0	1	7	23	12	43	4.06	33	4.15
Work with veterinarians in developing herd health program	0	2	7	21	13	43	4.04	33	4.00

Disinfect buildings & equipment	0	0	9	13	21	43	4.27	33	4.18
Select proper chemical to clean buildings & equipment	0	2	11	18	11	42	3.90	32	3.84
Use insecticide repellents in buildings	0	2	14	20	7	43	3.74	33	3.66
Apply insecticides to hogs to control external parasites	0	1	9	23	9	42	3.95	33	3.96
Identify symptoms of common hog diseases	0	0	4	22	17	43	4.30	33	4.30
Identify symptoms of major hog parasites	0	1	2	33	17	43	4.30	33	4.15
Evaluate life cycles of parasites to determine control procedures	0	3	13	20	7	43	3.72	33	3.81
Calculate cost of treatments	1	4	19	16	3	43	3.37	33	3.27
Supply medication through feed & water	0	1	10	23	9	43	3.93	33	3.96
Isolate animals with transmissible diseases	0	0	4	16	21	42	4.38	33	4.45
Select appropriate method to control diseases	0	1	2	29	11	43	4.16	32	4.28
Worm animals	0	1	2	26	14	43	4.23	32	4.31
Vaccinate animals	0	0	7	21	15	43	4.18	32	4.25
Determine amount of medication or materials needed in specific situations	0	0	4	23	15	43	4.23	32	4.12
Interpret labels on medication & insecticide containers	0	1	3	22	17	43	4.27	32	4.06
Give intramuscular injections	0	1	8	25	9	43	3.97	32	3.96
Determine when to rotate hog pastures to control diseases & parasites	1	2	18	18	4	43	3.51	33	3.56
Observe new animals for symptoms of diseases & parasites	0	0	10	19	14	43	4.09	32	4.34
Determine when the veterinarian should be called	0	1	8	21	13	43	4.06	32	4.25
Apply medication to cuts & bruises	0	2	12	24	5	43	3.74	32	3.84
Identify & isolate injured animals	0	2	5	22	13	42	4.09	29	4.10
5. Handling & Caring for Animals									
Take body temperature of a sow	1	5	16	18	3	43	3.39	30	3.50
Assist animals in delivering young	0	1	5	14	24	44	4.38	31	4.00
Castrate animals	0	0	8	15	21	44	4.29	31	4.09
Check animals' milk supply	0	0	4	23	17	44	4.29	31	3.77
Clean newborn animals	0	3	14	16	10	43	3.76	31	3.74
Determine space needed for animals	0	3	4	24	13	44	4.06	31	3.93
Disinfect & clip naval cord	0	2	11	19	12	44	3.93	31	3.90

Evaluate influence of stress on growth & condition of animals	0	1	12	23	6	42	3.80	31	3.83
Exercise animals	5	4	13	19	3	44	3.25	31	3.51
Help young to nurse	0	4	10	17	13	44	3.88	31	3.67
Identify signs of approaching birth	0	1	6	24	13	44	4.11	31	4.12
Identify due dates for animals	0	1	4	23	15	43	4.20	31	4.09
Isolate newly purchased animals for observation	0	1	8	14	21	44	4.25	31	4.29
Mark animals for identification	1	3	8	20	12	44	3.88	31	3.87
Move brood sows to farrowing quarters	0	3	6	17	18	44	4.13	31	3.90
Move feeder animals into proper feedlots	0	1	10	24	9	44	3.93	30	3.83
Observe animals regularly	0	0	3	17	24	44	4.47	31	4.29
Pen animals according to size, weight, & sex	0	0	9	25	10	44	4.02	31	3.96
Remove afterbirth	0	3	11	18	11	43	3.86	31	3.54
Remove non-compatible animals	0	2	10	20	12	44	3.95	31	3.87
Trim feet	2	8	19	10	5	44	3.18	31	2.96
Weigh animals	1	6	23	10	4	44	3.22	31	3.12
Clip needle teeth	0	3	12	19	10	44	3.81	31	3.90
Cut tails on feeder pigs	3	2	13	18	8	44	3.59	31	3.87
Give iron shots	0	2	5	17	19	43	4.23	31	4.29
Check underlines on sows for herina & inverted teats	0	1	10	15	18	44	4.13	31	3.93
De-tusk boars	0	5	17	15	6	43	3.51	31	3.64
Regulate temperature & air flow in farrowing quarters	0	1	8	16	19	44	4.20	31	4.29
Place pigs in brooder or use heat lamps	0	0	5	20	18	43	4.30	31	4.25
Wash sows & gilts before moving to farrowing quarters	0	1	25	13	4	43	3.46	31	3.77
Paint sow's underline with iron compound	7	7	18	11	0	43	2.76	31	3.12
Ring animals	4	3	11	18	5	41	3.41	30	2.76
6. Handling & Disposing of Animal Wastes (Swine)									
Evaluate how animal wastes decay	3	13	16	11	0	43	2.81	31	3.06
Prevent waste runoff from feedlots & housing quarters	1	1	9	21	11	43	3.93	31	3.83
Remove dead animals	0	1	1	19	22	43	4.44	31	4.45
Remove manure from quarters & pens	1	1	3	16	22	43	4.32	31	4.29

Spread manure on field	1	4	8	17	13	43	3.86	31	3.74
Compare advantages & disadvantages of solid vs liquid manure management systems	2	5	16	15	5	43	3.37	31	3.41
Identify odor & polution problems of swine waste disposal	2	4	14	14	6	40	3.45	30	3.76
7. Maintain Swine Buildings & Equipment									
Adjust belts	1	2	14	19	5	41	3.60	28	3.75
Adjust chains	1	2	15	17	5	40	3.57	29	3.75
Adjust controls on equipment	1	1	9	24	6	41	3.80	29	3.89
Check for missing equipment parts or hardware	1	1	17	17	6	42	3.61	29	3.82
Follow written assembly instructions	1	2	11	20	7	41	3.73	29	3.89
Inspect equipment for operating defects	1	1	9	23	6	40	3.80	29	4.00
Install equipment in appropriate places	1	2	11	20	7	41	3.73	29	3.93
Interpret assembly diagrams	2	0	21	12	6	41	3.48	29	3.65
Interpret assembly instructions	2	2	17	14	5	40	3.45	29	3.82
Use proper equipment & tools to assemble & install equipment	1	2	15	17	6	41	3.60	29	3.68
Adjust safety shields	1	1	6	19	14	41	4.07	29	4.06
Apply wood & metal preservatives	1	4	13	16	7	41	3.58	29	3.72
Clean & oil electric motors on structures	0	2	8	24	7	41	3.87	29	3.96
Build & remove concrete forms	3	7	19	10	2	41	3.02	29	3.31
Determine cost of repairs	0	5	15	14	7	41	3.56	29	3.65
Develop bill of materials needed for repairs	1	5	11	21	2	40	3.45	29	3.31
Repair & hang gates & doors	2	3	14	14	8	41	3.56	30	3.60
Install electrical motors	1	3	17	17	3	41	3.43	29	3.37
Mix, pour, finish & cure concrete	1	6	20	11	3	41	3.21	30	3.36
Read & interpret blueprints	3	9	15	12	2	41	3.02	29	3.31
Install & repair bracing in buildings	2	2	21	11	4	40	3.32	30	3.46
Repair electrical cords & wires	1	1	11	16	11	40	3.87	30	3.93
Repair minor leaks in roof of buildings	2	0	14	16	8	40	3.70	30	3.60
Replace belts & pulleys	2	0	13	17	8	40	3.72	29	3.58
Reset electrical switches	3	0	12	17	8	40	3.67	29	3.79
Reset circuit breakers	2	1	10	18	9	40	3.77	29	3.79
Replace fuses	2	1	11	18	8	40	3.72	30	3.90
Replace lighting fixtures	2	1	14	15	8	40	3.65	30	3.60
Replace valves in water system	1	2	17	12	8	40	3.60	30	3.76
Repair faucets	2	1	13	12	7	40	3.52	29	3.65

Replace water pipe	1	1	18	12	8	40	3.62	30	3.53
Replace window panes	1	2	17	15	5	40	3.52	30	3.63
Wire simple electrical circuit	0	3	11	17	9	40	3.80	30	3.56
Construct & repair fences & gates	0	4	10	15	10	39	3.79	30	3.83
Repair wood siding on buildings & structures	2	5	15	9	7	38	3.36	29	3.51
Evaluate a swine building for space per pig, ventilation, manure disposal, animal comfort, lighting needs & feeder space	0	2	2	14	15	33	4.27	27	4.22
8. Marketing & Shipping Hogs									
Determine cost of production	0	1	8	17	15	41	4.12	30	4.20
Calculate expected returns & profits on sales	0	2	8	18	13	41	4.02	30	3.96
Classify animals for market purposes	1	1	14	14	11	41	3.80	30	3.83
Determine feasibility of participating in futures market	1	7	19	13	1	41	3.14	31	3.41
Evaluate influence of market grade on returns	0	4	11	19	7	41	3.70	31	3.70
Load animals	0	8	9	16	8	41	3.58	31	3.54
Prepare truck for hauling animals	0	9	9	16	7	41	3.51	30	3.50
Select markets	0	3	7	14	17	41	4.09	31	4.22
Interpret market reports	1	3	10	16	11	41	3.80	31	4.00
Analyze market cycles	2	7	8	13	11	41	3.58	31	3.87
Select appropriate marketing system	1	3	8	18	11	41	3.85	31	3.87
Select truckers	4	7	5	16	9	41	3.46	31	3.58
Identify characteristics of USDA grades	1	4	11	16	9	41	3.68	31	3.77
Determine affect middlemen & retailers have on producers' prices	0	5	12	18	6	41	3.60	31	3.35
Determine whether animals should be held over for another year's income	0	4	8	21	8	41	3.80	31	3.74
Determine most economical weights to market	0	2	7	18	14	41	4.07	31	4.09
Calculate shrinkage	0	5	13	17	6	41	3.58	31	3.54
Calculate dressing percent	0	8	11	15	7	41	3.51	31	3.41
Estimate market grades	0	6	14	15	6	41	3.51	30	3.40
Develop plan to spread marketing throughout year	1	2	8	25	6	42	3.78	31	3.83

Compate grade & weight marketing with daily bid market	1	4	10	21	6	42	3.64	31	3.70
Sort animals according to size & weight	0	2	6	17	16	41	4.14	31	4.03
Determine when animals are ready to market	1	0	1	20	19	41	4.36	31	4.25
Determine number of animals to load	0	4	7	17	12	40	3.92	31	3.64
Calculate corn-hog ratio	0	1	10	20	8	39	3.87	31	3.61
9. Select Beef Breeding or Feeder Cattle									
Identify major breeds of beef cattle	1	5	13	10	4	33	3.33	29	3.24
List the desirable characteristics of each breed & the disadvantages	0	5	14	10	4	33	3.39	29	3.31
Compare value of cross breeding with other breeding systems	0	2	11	13	7	33	3.75	29	3.68
Determine age of animals	0	3	13	15	2	33	3.48	29	3.44
Establish production goals for culling purposes	0	1	9	13	10	33	3.96	29	3.68
Evaluate advantages of various breeds	0	3	12	14	4	33	3.57	28	3.53
Evaluate general condition of animals	0	3	8	14	8	33	3.81	28	3.96
Evaluate influence of consumers' demands on type of animal to select	0	2	14	10	7	33	3.66	28	3.46
Evaluate overall performance & health records of animals	0	2	10	14	6	32	3.75	28	4.03
Evaluate the degree various traits & characteristics are inherited	0	3	13	11	6	33	3.60	28	3.85
Identify major meat cuts of animals	1	6	14	8	4	33	3.24	28	3.25
Identify parts of animals	0	5	14	11	2	32	3.31	28	3.28
Identify reputable sources for obtaining stock	0	4	9	10	10	33	3.78	28	3.92
Inspect animals for defects	0	3	8	11	11	33	3.90	28	4.07
Inspect animals for desirable traits & characteristics	0	1	8	11	12	32	4.06	28	4.03
Select breeding system to follow	0	1	6	16	10	33	4.06	28	4.07
Select feeder cattle for health, growth, & quality	0	1	6	13	13	33	4.15	28	4.32
10. Breeding Beef Cows & Heifers									
Determine number of bulls needed for cow herd	0	1	4	20	7	32	4.03	26	3.96

Evaluate time of calving in terms of feed availability, cow condition & marketing program	0	3	3	14	12	32	4.09	27	4.11
Determine when to breed	0	2	5	15	11	33	4.06	27	4.25
Identify causes of breeding problems	0	2	3	14	13	32	4.18	27	4.25
Evaluate merits of strus synchronization	0	0	11	13	5	29	3.79	27	3.62
Compare AI & natural service for the cow herd & select a method	0	3	10	16	5	34	3.67	27	3.74
Determine due dates for bred animals	0	2	6	14	12	34	4.05	27	3.92
Pregnancy check herd	0	2	9	11	10	32	3.90	27	4.07
11. Handling & Treating Beef Cattle									
Assist animals in delivering young	1	1	5	12	14	33	4.12	26	4.19
Castrate animals	0	0	5	16	11	32	4.18	27	4.14
Check animals' milk supply	0	1	5	17	10	33	4.09	27	3.85
Clean newborn animals	0	3	15	11	3	32	3.43	27	3.59
Dehorn animals	0	0	9	15	9	33	4.00	28	3.92
Determine space needed for animals	0	1	8	15	8	32	3.93	28	3.92
Disinfect & clip naval cord	1	3	14	11	3	32	3.37	27	3.66
Evaluate influence of stress on growth & condition of animals	0	2	12	15	4	33	3.63	28	3.67
Help young to nurse	0	3	7	12	11	33	3.93	27	3.74
Identify signs of approaching birth	1	0	6	15	11	33	4.09	27	4.00
Identify due dates for animals	0	2	6	16	9	33	3.96	27	4.03
Isolate newly purchased animals for observation	0	1	8	13	11	33	4.03	28	4.17
Mark animals for identification	0	1	8	15	9	33	3.96	28	3.82
Move feeder animals into proper feedlots	0	2	5	20	6	33	3.90	28	3.64
Observe animals regularly	0	2	2	11	18	33	4.36	28	4.35
Pen animals according to size, weight, & sex	0	3	9	14	7	33	3.75	28	3.96
Remove afterbirth	0	5	10	10	8	33	3.63	27	3.51
Remove non-compatible animals	0	3	9	16	5	33	3.69	28	3.85
Trim hoofs	0	6	17	9	1	33	3.15	28	3.28
Weigh animals	0	7	14	11	1	33	3.18	28	3.14
Bed animals	0	6	18	13	6	33	3.57	28	3.28
Treat cattle for internal & external parasites	0	3	5	16	8	32	3.90	28	4.14
Implant growth stimulant (Ralgro or Synovex)	0	5	11	13	3	32	3.43	28	3.67
Take temperature of cattle	1	5	12	10	2	30	3.23	27	3.29

12. Planning & Feeding for Economic Gains									
Identify symptoms of nutritional imbalance	0	1	3	24	3	31	3.93	26	3.96
Evaluate use of cattle to harvest or utilize crop aftermath	0	1	7	19	4	31	3.83	27	4.00
Plan pasture program for full season	0	1	8	18	4	31	3.80	28	3.78
Develop rations	0	1	7	14	9	31	4.00	28	3.96
Calculate cost of rations & feed mixtures	0	2	5	12	12	31	4.09	28	4.00
Calculate feed efficiency	0	2	5	11	13	31	4.12	28	3.82
Classify feeds	0	3	9	16	3	31	3.61	28	3.60
Determine amount of feed additives to add to mixtures	0	3	7	12	8	30	3.83	28	4.07
Determine amount to feed per animal	0	1	7	16	6	30	3.90	28	4.00
Determine appropriate form for preparing feed	0	2	7	16	5	30	3.80	27	3.66
Determine relative nutritive value of available feedstuffs	0	1	5	17	7	30	4.00	28	3.89
Determine total amount of feed needed for herds	0	1	4	17	6	29	3.96	28	4.10
Supply water requirements for animals	0	2	2	7	19	30	4.43	28	4.14
Feed monensin (Rumensin) at recommended level	0	2	8	11	8	29	3.86	28	3.64
Determine when feed additives must be withdrawn from animals	0	2	3	9	17	31	4.32	28	4.39
Determine when rations & mixtures should be changed	0	1	6	13	11	31	4.09	28	4.00
Determine which feeds & additives may be included in animal feed mixtures	0	0	6	13	12	31	4.19	28	3.96
Determine which feedstuffs & amount of feedstuffs may be substituted in rations	0	1	7	16	7	31	3.93	28	3.78
Evaluate the influence the quality of feedstuffs has on production	0	1	4	17	9	31	4.09	28	3.85
Evaluate how ration imbalance may affect production	0	0	5	16	10	31	4.16	28	3.82
Identify factors that influence feed requirements & feed efficiency	0	1	6	18	6	31	3.93	27	4.03
Identify factors that influence the quality of feedstuffs	0	2	11	13	4	30	3.63	27	3.88
Determine purpose of various feedstuffs in rations & mixtures	0	1	10	14	4	29	3.72	27	3.62

Evaluate the influence the digestive system has on feedstuffs that may be fed	0	2	10	15	3	30	3.63	27	3.59
Interpret feed analysis reports	0	2	10	11	7	30	3.76	27	3.77
Interpret feed tags & labels	0	3	9	11	7	30	3.73	27	3.77
Interpret feeding charts & tables	0	3	8	12	7	30	3.76	26	3.65
Select appropriate feeding methods	0	2	5	18	5	30	3.86	27	3.70
Determine how feed palatability may be improved	0	2	12	13	3	30	3.56	26	3.61
Work with veterinarian & feed salesman in formulating feed mixtures & planning feeding program	0	5	7	12	6	30	3.63	27	3.59
Identify essential nutrients needed in rations & mixtures	0	2	5	21	2	30	3.76	27	3.85
Evaluate how feed additives influence production & efficiency	0	2	6	19	3	30	3.76	27	3.81
Fill feed troughs & bunks	0	6	6	10	8	30	3.66	25	3.96
Prepare feed mixtures	0	3	7	14	6	30	3.76	27	3.77
Flush animals	0	4	12	10	4	30	3.46	26	3.61
Calculate rations & creep feed calves up to weaning	0	1	6	16	7	30	3.96	26	3.84
Calculate ration & feed ration for gestating brood cows & heifers	0	0	8	15	7	30	3.96	26	3.92
Calculate & feed ration for wintering brood cows & heifers	0	1	8	17	4	30	3.80	26	3.84
Calculate & feed ration for replacement heifers	0	0	10	16	4	30	3.80	26	3.96
Calculate & feed ration for weaned beef calves	0	0	8	16	6	30	3.93	26	4.00
Calculate & feed ration for feeder cattle	0	0	6	18	6	30	4.00	27	4.07
Calculate & feed ration for beef bulls	0	0	9	17	4	30	3.83	25	3.96
Calculate & feed ration for beef show animals	3	3	8	10	6	30	3.43	26	3.88
Precondition animals for shipping or feedlot	0	2	8	12	8	30	3.86	27	3.77
Wean animals	0	1	10	10	9	30	3.90	27	3.77
Evaluate affect of various feeding practices on carcass composition & feed efficiency	0	2	10	15	2	29	3.58	27	3.59
Determine when calves may be started on roughages & grains	0	1	11	16	1	29	3.58	26	3.84
Replace salt & mineral blocks	0	3	3	11	11	29	3.96	27	4.03

Identify moldy or spoiled feedstuffs	1	3	7	9	9	29	3.75	25	4.16
13. Maintaining Beef Cattle Buildings & Equipment									
Adjust belts on equipment	3	1	11	12	3	30	3.36	26	3.76
Adjust chains on equipment	3	1	11	12	3	30	3.36	27	3.66
Adjust controls on equipment	3	0	13	11	3	30	3.36	26	3.69
Adjust safety shields on equipment	2	1	5	10	12	30	3.96	27	3.85
Check for missing equipment parts or hardware	2	1	10	10	7	30	3.63	27	3.88
Follow written assembly insturctions	2	2	9	13	4	30	3.50	27	3.74
Identify hardware	1	3	14	10	2	30	3.30	27	3.59
Inspect equipment for operating defects, clean & oil	2	0	11	10	7	30	3.66	27	4.00
Install equipment in proper places	2	1	9	13	5	30	3.60	27	3.85
Interpret assembly diagrams	1	3	11	12	3	30	3.43	27	3.59
Interpret assembly instructions	1	2	13	10	4	30	3.46	27	3.62
Use proper equipment & tools to assemble & install equipment	2	1	10	13	4	30	3.53	27	3.59
Prevent waste runoff from feedlots	0	1	7	13	9	30	4.00	27	3.96
Remove dead animals & dispose of properly	0	2	2	13	13	30	4.23	27	4.29
Remove manure from quarters or pens	1	1	7	13	8	30	3.86	27	3.92
Spread manure on fields when bare or unfrozen	1	2	10	8	9	30	3.73	27	3.59
Determine cost of repairs	2	0	11	14	3	30	3.53	36	3.84
Develop bill of materials for repairs	2	2	12	13	1	30	3.30	27	3.40
Repair & hang gates & doors	3	3	8	11	5	30	3.40	27	3.51
Install electrical motors	3	3	13	10	1	30	3.10	27	3.18
Lay blocks	3	8	14	5	0	30	2.70	25	2.88
Mix, pour, finish, & cure concrete	2	7	14	6	1	30	2.90	25	3.16
Read & interpret blueprints	3	6	13	6	2	30	2.93	26	3.34
Install & repair bracing in buildings & structures	0	6	14	8	2	30	3.20	25	3.48
Repair electrical cords & broken wires	1	5	8	10	6	30	3.50	26	3.96
Repair minor leaks in roof of buildings	1	4	12	9	3	29	3.31	26	3.69
Replace belts & pulleys	2	2	13	10	3	30	3.33	26	3.84
Reset circuit breakers	2	3	13	9	3	30	3.26	26	3.69
Replace electrical switches	2	2	14	9	3	30	3.30	26	3.76
Replace fuses	1	4	11	11	3	30	3.36	26	3.69
Replace lighting fixtures	2	2	14	10	2	30	3.26	26	3.69

	Replace valves in water system	1	4	13	8	4	30	3.33	26	3.88
	Repair faucets	2	2	14	8	4	30	3.33	26	3.69
	Replace water pipe	1	3	16	7	3	30	3.26	26	3.61
	Replace window panes	3	5	13	6	2	29	2.96	27	3.37
	Wire simple electrical circuit	2	2	12	6	7	29	3.48	26	3.50
	Construct & repair fences & gates	2	3	9	10	5	29	3.44	27	3.70
	Install & repair wood siding on buildings & structures	2	7	12	3	2	26	2.84	24	3.45
14.	**Marketing & Shipping Beef Cattle**									
	Determine cost of production	1	1	3	12	13	30	4.16	27	4.18
	Calculate expected returns & profits on sales	0	1	5	12	12	30	4.16	27	4.14
	Classify animals for market purposes	0	1	9	15	5	30	3.80	27	3.81
	Determine feasibility of participating in futures market	0	5	19	4	2	30	3.10	27	3.44
	Evaluate influence of market grade on returns	0	2	10	14	4	30	3.66	27	3.74
	Load animals	0	5	12	9	4	30	3.40	27	3.51
	Prepare animals for hauling	0	5	11	9	5	30	3.46	27	3.55
	Select markets	0	2	8	11	9	30	3.90	27	4.03
	Interpret market reports	0	2	10	12	6	30	3.73	27	3.85
	Analyze market cycles	0	6	7	11	6	30	3.56	27	3.44
	Select appropriate marketing system	0	1	6	16	7	30	3.96	27	3.85
	Select truckers	0	6	9	8	7	30	3.53	27	3.62
	Indentify characteristics of USDA grades	1	2	9	12	6	30	3.66	27	3.51
	Determine whether animals should be held over for another year's income	0	3	3	17	7	30	3.73	27	3.96
	Determine most economical weights to market	1	2	4	15	8	30	3.90	27	4.14
	Calculate shrinkage	2	2	10	10	6	30	3.53	27	3.55
	Calculate dressing percent	2	4	8	8	8	30	3.53	27	3.51
	Estimate market grades	1	2	12	10	5	30	3.53	27	3.70
	Develop plan to spread marketing throughout year	0	3	6	16	5	30	3.76	27	3.88
	Sort animals according to size & weight	0	2	7	17	4	30	3.76	27	4.03
	Determine when animals are ready to market	0	1	5	17	7	30	4.00	27	4.33
	Determine number of animals to load	1	2	13	10	4	30	3.46	27	3.70
	Evaluate influence grass-fed cattle have on meat prices	0	2	14	10	4	30	3.53	27	3.25

15. Observing Legal Practices in Meat Production										
Follow FDA laws related to chemical use & disposal	0	1	4	10	15	30	4.30	28	4.39
Interpret feed additive withdrawal laws & regulations	0	3	2	8	17	30	4.30	28	4.46
Interpret feed additive mixing regulations	0	3	3	9	15	30	4.20	28	4.28
Identify shipping regulations for breeding stock	0	2	4	10	14	30	4.20	28	4.00
Identify EPA regulations which apply to cattle operations	1	2	6	11	10	30	3.90	28	3.89
Follow regulations for identification of feeder pigs & slaughter animals	0	3	3	14	9	29	4.00	28	4.10
Evaluate DNR regulations on waste management & point source polution	1	4	6	10	8	29	3.68	27	3.77

Crop Production Cluster

Twenty-two duty areas compose the Crop Production cluster. They are ranked by their mean value (in parenthesis) determined by the "Southwest" sample followed by "Statewide" sample rank and mean.

RANK ORDER

1 Identify and control major crop pests of forage, small grain, and corn (4.56), 20-(4.32)

2 Plan and apply corn fertilizers (4.47), 1-(4.35)

3 Prepare seedbed and plant corn (4.38), 8-(4.06)

4 Plan and carry out soil nutrient program for forages (4.35), 2-(4.32)

5 Harvest, condition, and store corn as grain (4.34), 9-(4.04)

6 Determine soil and water conservation measures for crop land (4.31), 6-(4.16)

7 Harvest and store forages (4.27), 4-(4.28)

8 Establish forage seedings (4.25), 5-(4.22)

9 Calculate the economics of crop production (4.22), 7-(4.12)

10 Evaluate varieties and select seed corn (4.16), 10-(3.95)

11 Follow legal practices in crop production (3.94), 13-(3.68)

12 Establish small grain plantings (3.93), 12-(3.72)

13 Harvest and store small grain (3.91), 15-(3.54)

14 Identify forage crop plants and seeds (3.87), 14-(3.64)

15 Harvest and store corn as silage (3.86), 11-(3.87)

16 Identify small grain seed and select varieties (3.85), 15-(3.54)

17 Market corn (3.46), 17-3.34)

18 Fertilize small grain (3.43), 18-(3.24)

19 Market soybeans (2.81), 21-(2.82)

20 Harvest, condition, and store soybeans (2.80), 19-(2.93)

21 Plant soybeans and apply nutrients (2.76), 20-(2.88)

22 Evaluate and select soybean seed (2.70), 22-(2.75)

The most important Crop Production tasks were ranked by the "Southwest" sample. The "Southwest" mean is listed in parenthesis followed by the "Statewide" rank and mean value:

DUTY	TASK	
7	24	Select correct field travel and PTO speed for applying chemicals (4.62), 8-(4.20)
13	7	Select seed corn for yield, harvestability, soil adaptation, disease and insect resistance, and standability (4.56), 2-(4.36)
8	5	Recognize the proper stage of maturity to harvest for highest quality forage (4.54), 1-(4.44)
7	8	Determine amount of chemical to apply (4.53), 6-(4.28)
7	6	Calibrate sprayer or granule applicator (4.51), 11-(4.16)
7	25	Select correct type and size of nozzle and tips (4.51), 14-(4.14)
6	8	Use soil test results to plan fertility programs (4.50), 4-(4.34)
7	26	Adjust applicating equipment (4.48), 18-(4.12)
7	27	Select proper application pressure (4.46), 18-(4.12)
8	6	Evaluate the quality of forage being fed (4.44), 6-(4.28)
10	7	Calibrate grain seeding machinery (4.42), ?-(3.93)
15	8	Prepare a corn planter to plant a desired population and apply fertilizer and insecticide at recommended rates using table on machine or in operators manual (4.42), ?-(3.87)

Complete results, for the two survey groups, by duty area and task follows:

TABLE 7

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS: CROP PRODUCTION CLUSTER

U.S.O.E. Code 01.01 02 01 01, 01.01 02 01 04, 01.01 02 01 03 DOT Code 401.181

Skills in and knowledge of the production and preparation of plants may be necessary in maintaining a dairy or livestock enterprise or may directly produce income through marketing.

						SOUTHWEST		STATEWIDE	
	OF NO IMPORTANCE	OF LOW IMPORTANCE	OF MEDIUM IMPORTANCE	OF HIGH IMPORTANCE	OF EXTREME IMPORTANCE	N=80 TOTAL RESPONSES	MEAN	N=51 TOTAL RESPONSES	MEAN
DUTY AREAS									
1. Follow legal practices in crop production	0	3	13	47	15	78	3.94	45	3.68
2. Determine soil & water conservation measures for crop land	0	1	9	34	36	80	4.31	49	4.16
3. Calculate the economics of crop production	0	0	9	44	27	80	4.22	50	4.12
4. Identify forage crop plants & seeds	0	3	20	41	16	80	3.87	51	3.64
5. Establish forage seedings	0	0	10	40	30	80	4.25	49	4.22
6. Plan & carry out soil nutrient program for forages	0	0	3	45	31	79	4.35	50	4.32
7. Identify & control major crop pests (insects, weeds & diseases) of forage, small grain & corn	0	0	3	28	48	79	4.56	50	4.32
8. Harvest & store forages	0	2	3	45	29	79	4.27	50	4.28
9. Identify small grain seed & select varieties	1	4	18	40	17	80	3.85	50	3.54
10. Establish small grain plantings	0	4	15	43	18	80	3.93	48	3.72
11. Fertilize small grain	3	11	21	38	7	80	3.43	49	3.24
12. Harvest & store small grain	0	3	15	48	14	80	3.91	48	3.54
13. Evaluate varieties & select seed corn	0	1	9	44	24	78	4.16	49	3.95
14. Plan & apply corn fertilizer	1	1	2	37	38	78	4.47	48	4.35
15. Prepare seedbed & plant corn	1	0	2	41	36	80	4.38	49	4.06
16. Harvest, condition & store corn as grain	0	0	5	41	32	78	4.34	49	4.04
17. Harvest & store corn as silage	4	2	13	42	18	79	3.86	47	3.87
18. Market corn	5	9	29	29	14	81	3.46	46	3.34
19. Evaluate & select soybean seed	16	16	11	20	4	67	2.70	45	2.75
20. Plant soybeans & apply nutrients	16	14	14	20	5	69	2.76	44	2.88
21. Harvest, condition & store soybeans	15	13	14	20	5	67	2.80	43	2.93
22. Market soybeans	16	13	15	18	7	69	2.81	46	2.82

TASKS									
1. Follow Legal Practices in Crop Production									
Identify government agencies which control or regulate crop practices	0	2	17	49	7	75	3.81	44	3.20
Determine that seed conforms to Wis. Dept. of Ag. labeling law and/or US Plant Protection Act	1	4	24	34	12	75	3.69	45	3.31
Obtain training in pesticide application (license for restricted chemicals)	6	2	13	36	20	77	3.80	46	3.65
Identify government regulations regarding grading or marketing of crops	3	11	24	34	5	77	3.35	46	2.91
2. Determine Soil & Water Conservation Measures for Crop Land									
Evaluate utilization of soil conservation service technicians in land use planning	0	8	17	34	20	79	3.83	50	3.44
Determine merits of ASCS assistance in conserving soil & water	0	3	28	28	20	79	3.82	50	3.34
Take soil samples & submit to testing laboratory	0	0	8	37	35	80	4.33	49	4.20
Evaluate land preparation practices for cost benefits (contour, terrace, irrigation, et.)	0	2	14	38	26	80	4.10	49	3.67
Determine method & time of animal waste utilization	0	4	25	43	8	80	3.68	49	3.67
3. Calculate the Economics of Crop Production									
Determine realistic crop yield goals	0	2	11	52	14	79	3.98	51	3.84
Determine results obtained from the modification or adoption of new practices	0	1	18	42	19	80	3.98	51	3.68
Determine the cost of production of each crop	0	1	14	36	29	80	4.16	51	4.00
Evaluate profit potential of marketing direct or through livestock	0	1	10	42	27	80	4.18	51	4.13

Determine the profitability of grazing livestock on, or soil incorporation of crop residue	0	3	28	39	9	79	3.68	50	3.52
Calculate economic return from various fertilizing programs for each crop	0	0	11	47	22	80	4.13	51	4.11
4. Identify Forage Crop Plants & Seeds									
Identify locally grown forage legume & grass plants & seeds	0	6	21	44	9	80	3.70	50	3.42
Evaluate advantages or disadvantages of pure stands or forage mixtures	0	4	19	45	12	80	3.81	51	3.50
Select adopted varieties of forage crops	0	1	11	43	25	80	4.15	49	4.00
Calculate pure live seed from seed tag information	0	4	19	36	21	80	3.92	50	3.68
Evaluate benefits or disadvantages of various seed pretreatments	0	2	32	32	14	80	3.72	50	3.54
5. Establish Forage Seedings									
Describe tillage practices required for seeding establishment or renovation	0	0	23	47	10	80	3.83	49	3.65
Identify machinery & methods used in establishing forage stands	0	1	27	41	11	80	3.77	49	3.51
Analyze the comparative costs of chemical vs nurse-crop production methods	0	8	26	27	19	80	3.71	48	3.62
Identify problems related to seeding failures	0	0	5	43	32	80	4.33	48	4.14
Identify characteristics of a good seedbed & prepare soil	0	1	9	40	30	80	4.23	49	3.97
Determine seeding rate for variety & quality of seed & planting method	0	0	10	36	34	80	4.30	49	4.00
Determine when to seed	0	1	16	43	20	80	4.02	49	3.83
Determine seeding depth for soil & moisture	0	1	7	42	30	80	4.26	49	3.93
Calibrate seeder & operate	0	0	6	33	41	80	4.43	49	4.02
Determine methods for control of competition from weeds, nurse crop & combined straw	0	0	10	42	26	78	4.20	48	3.75

6. Plan & Carry Out Soil Nutrient Program									
Determine when to apply fertilizer & lime	0	0	16	34	29	79	4.16	50	3.96
Evaluate affect teaching & placement have on nutrient availability	0	1	16	44	18	79	4.00	51	3.54
Evaluate influence soil pH has on nutrient availability	0	0	13	36	30	79	4.21	51	3.86
Identify function of lime in crop production	1	0	10	42	26	79	4.16	51	3.90
Identify function of major nutrients in forage production	0	0	10	41	28	79	4.22	51	3.82
Identify function of micro nutrients in forage production	0	2	18	41	18	79	3.94	51	3.60
Identify nutrient deficiency symptoms in forage crops	0	0	6	41	32	79	4.32	51	3.92
Use soil test results to plan fertility programs	0	0	4	31	44	79	4.50	50	4.34
Interpret labels on fertilizer bags	0	1	13	39	25	78	4.12	51	3.86
Evaluate the different methods of applications & available form of plant nutrients	0	1	14	47	17	79	4.01	51	3.68
Calculate estimated costs of fertilizer & lime needed	0	0	10	44	25	79	4.18	51	3.80
Determine amount of fertilizer & lime to apply	0	0	5	36	38	79	4.41	51	4.15
Determine kind of fertilizer & lime to apply	0	2	11	32	32	77	4.22	51	4.03
Select proper method to apply fertilizer	0	1	22	33	22	78	3.97	50	3.78
Evaluate factors that influence effectiveness of fertilizers	0	0	14	43	22	79	4.10	50	3.72
Calibrate fertilizer equipment	0	0	5	39	32	76	4.35	47	3.87
Adjust rates of fertilizer application for specific conditions	0	0	5	46	27	78	4.28	50	3.92
Recognize signs of fertilizer injury	0	0	13	38	22	73	4.12	49	3.93

7. Identify & Control Major Crop Pests of Forages Small Grains & Corn									
Identify insect & disease pests responsible for significant economic loss of crops	0	0	7	37	33	77	4.33	50	4.02
Distinguish between insect, disease & chemical damage of crops	0	1	4	47	26	78	4.25	50	3.90
Identify broadleaf & grassy weed plants common in cropland	0	0	12	47	19	78	4.08	50	3.76
Identify method or propagation of major weed pests	0	2	12	46	17	77	4.01	50	3.60
Identify common weed seeds associated with crop competition	0	2	14	44	18	78	4.00	49	3.44
Calibrate spray or granual applicator	0	0	5	28	45	78	4.51	50	4.16
Observe residue limitations or restrictions on crop use when certain pesticides are applied	0	0	6	39	33	78	4.34	49	4.12
Determine amount of chemical to apply	0	0	1	34	43	78	4.53	50	4.28
Determine when to apply chemicals	0	0	7	37	34	78	4.34	50	4.14
Evaluate influence of diseases & pests on crop production	0	0	7	48	22	77	4.19	50	3.74
Evaluate life cycle of insects to determine appropriate control procedures	0	2	17	41	18	78	3.96	50	3.60
Identify disease & insect resistant varieties of plants	0	1	11	43	23	78	4.12	50	3.80
Identify various means by which disease & insects are spread	0	1	24	38	15	78	3.85	50	3.82
Mix chemicals	0	3	10	34	29	76	4.17	49	4.02
Select appropriate chemicals to control various insect pests & diseases	0	0	4	40	32	76	4.36	50	4.12
Use appropriate method to apply chemicals	0	1	6	33	38	78	4.38	50	4.08
Use mechanical & cultural means to control insects & diseases	0	0	9	51	18	78	4.11	50	3.88
Inspect crops to determine when controls are needed	0	0	8	40	29	77	4.27	50	4.14
Distinguish between harmful & beneficial insects	0	0	20	42	16	78	3.94	50	3.98
Contact appropriate insect & disease specialists	0	1	26	41	10	78	3.76	50	3.70
Interpret chemical labels	0	0	6	35	37	78	4.39	49	4.08

Destroy disease, insect or chemical contaiminated plant residue	0	0	8	39	30	77	4.28	49	3.77
Calculate cost of controls	0	0	10	45	23	78	4.16	48	3.83
Select correct field travel & PTO speed for applying chemicals	0	0	2	25	51	78	4.62	49	4.20
Select correct type & size nozzles & tips	0	1	2	31	44	78	4.51	49	4.14
Adjust applicating equipment	0	1	2	33	42	78	4.48	49	4.12
Select proper application pressure	0	1	2	35	40	78	4.46	49	4.12
Determine total amount of chemical needed	0	1	4	35	38	78	4.41	49	4.08
Interpret chemical compatability charts	0	1	5	36	31	73	4.32	49	4.02
8. Harvest & Store Forages									
Recognize possible bloat problems & recommend preventive measures	0	0	11	38	29	78	4.23	50	4.10
Explain the need for root reserves and/or leaf area for proper regrowth	0	1	16	45	16	78	3.97	50	3.88
Recognize the effects of grazing too early, overgrazing, or clipping on forage fields	1	0	12	38	28	79	4.16	50	3.98
Determine the optimum moisture content for beginning machine harvest to insure proper storage & preservation	1	0	7	42	38	78	4.23	50	4.18
Recognize the proper stage of maturity to harvest for highest quality forage	0	0	5	25	47	77	4.54	50	4.44
Evaluate the quality of forages being fed	0	0	4	34	38	76	4.44	50	4.28
Evaluate the alternative costs of different forage harvesting & storing methods	0	2	9	49	18	78	4.06	50	4.06
Use weather information to reduce risk of rain damage in forage harvesting	1	6	16	34	22	79	3.88	50	3.74
Use machinery efficiently to minimize harvest time	0	0	6	46	27	79	4.26	50	3.92
Compute tonnage of forage in various shaped storage structures	0	5	31	39	4	79	3.53	50	3.34
Compute the carrying capacity of pastures	0	7	21	43	8	79	3.65	49	3.42
Determine the value of forages in a crop rotation	0	0	11	50	18	79	4.08	50	3.86
Recognize common forage problems: winterkill disease, herbicide carryover, etc.	0	0	12	42	25	79	4.16	50	4.02

Determine the relative nutrient value of silage, green chop & haylage	2	2	11	34	30	79	4.11	50	4.04
Identify safety hazards present in harvesting, transporting & storing forages	1	2	12	41	23	79	4.05	50	3.98
Explain the comparative advantages of various forage storage structures	2	4	20	42	11	79	3.70	49	3.67
Identify & explain the operating principles of forage handling & storage equipment	0	2	25	42	9	78	3.74	49	3.53
Explain how local prices for forages are established in the local community	0	12	36	27	4	79	3.29	49	3.02
Describe the problems involved in marketing forages	2	11	42	20	4	79	3.16	49	2.97
Determine the market grades of hay	0	10	24	31	14	79	3.62	49	3.26
Explain the criteria for quality forages: odor, color, leafiness, & freedom from foreign material	1	3	22	36	17	79	3.82	49	3.48
Adjust machines used in harvesting forages & forage seed	1	1	13	41	23	79	4.06	49	4.00
Describe the commercial products used for preservation in storage & their methods of application	0	11	31	32	5	79	3.39	49	3.34
Determine the relative advantages of conditioning forages	0	4	20	39	13	76	3.80	49	3.65
9. Identify Small Grain Seed & Select Varieties									
Identify major parts of small grain seeds & explain their function	3	11	33	28	3	78	3.21	50	2.88
Recognize the requirements for seed certification & their purpose	2	9	23	39	6	79	3.48	50	3.16
Secure a Wisconsin Crop Improvement Directory & determine variety availability	1	10	40	23	5	79	3.26	50	3.02
Utilize test plot data to select varieties for local soil & intended use	1	2	24	40	12	79	3.75	50	3.72
Calculate value difference between different lots of seed	0	7	27	40	4	78	3.52	50	3.30

10. Establish Small Grain Plantings									
Recognize tillage equipment to be used in seedbed preparation	0	0	21	48	10	79	3.86	48	3.47
Identify the characteristics of a good seedbed	0	2	8	45	24	79	4.15	47	3.91
Prepare a good seedbed	1	0	3	43	32	79	4.32	48	4.04
Compare drilling to broadcast seeding	2	4	22	40	11	79	3.68	47	3.59
Identify the types of planting equipment	0	4	26	40	9	79	3.68	48	3.41
Recommend the proper seeding rate & adjust that rate for seed quality	0	0	1	45	33	79	4.40	48	3.97
Calibrate grain seeding machinery	0	0	6	33	39	78	4.42	48	3.93
Seed small grain	0	3	9	44	22	78	4.08	48	3.77
11. Fertilize Small Grain									
Calculate estimated costs of fertilizer & lime needed	0	2	16	47	14	79	3.93	46	3.93
Determine amount of fertilizer & lime to apply	0	1	11	47	20	79	4.08	49	4.12
Recognize the effect of fertilizer rates on tillering & lodging	0	0	15	44	20	79	4.06	49	3.91
Determine kind of fertilizer & lime to apply	0	2	17	41	19	79	3.97	49	3.93
Determine when to apply fertilizer & lime	0	1	16	41	21	79	4.03	49	3.83
Evaluate affect teaching & placement have on nutrient availability	0	2	29	38	10	79	3.70	48	3.39
Evaluate influence soil pH has on nutrient availability	0	0	18	40	21	79	4.03	48	3.68
Indentify function of lime in grain production	1	2	20	41	15	79	3.84	47	3.59
Identify function of major nutrients in grain production	0	3	20	42	14	79	3.84	47	3.63
Identify function of micro nutrients in grain production	0	4	33	34	8	79	3.58	47	3.38
Identify nutrient deficiency symptoms in grain crops	0	0	21	44	14	79	3.91	45	3.66
Use soil test results to plan fertility program	0	1	6	32	40	79	4.40	45	4.31
Interpret labels on fertilizer bags	0	2	18	39	20	79	3.97	45	3.60

Evaluate influence nutrients have on plant growth	0	2	16	47	14	79	3.92	45	3.75
Determine the nutrient requirements of grain crops	0	4	15	44	13	76	3.86	45	3.82
Evaluate factors that influence effectiveness of fertilizers	0	3	12	50	11	76	3.90	44	3.59
Calibrate fertilizer equipment	0	1	4	43	28	76	4.28	45	3.93
Adjust rates of fertilizer application for specific conditions	0	1	6	43	26	76	4.23	45	3.95
Recognize signs of fertilizer injury	0	1	14	39	21	75	4.06	43	3.81
12. Harvest & Store Small Grains									
Compare the advantages & disadvantages of harvesting small grain as silage, high moisture grain or mature grain	0	2	18	43	14	77	3.89	50	3,92
Identify the proper stage of maturity for small grain haylage	1	3	12	36	28	80	4.08	50	4.36
Measure harvesting losses & adjust machine as necessary	0	0	14	33	33	80	4.23	50	3.90
Evaluate influence stage of maturity has on quality & value of grains	0	1	11	27	41	80	4.35	50	3.96
Follow weather forecasts	3	8	27	30	11	79	3.48	50	3.36
Take yield check	0	4	30	33	12	79	3.67	50	3.68
Cut stubble for straw	3	11	30	27	9	80	3.35	50	3.06
Bale straw	0	2	27	37	13	79	3.77	50	3.24
Control temperature & humidity in grain storage areas	0	2	22	27	28	79	4.02	50	3.92
Determine moisture content of grains	0	0	20	37	23	80	4.03	50	3.98
Determine safe moisture content for storing grains	0	0	10	40	30	80	4.25	50	4.20
Calculate amount of grains in storage	0	10	26	36	8	80	3.52	50	3.40
Estimate amount of storage space needed for grains	0	8	28	42	2	80	3.47	50	3.40
Evaluate influence moisture has on quality of grains	0	1	19	42	18	80	3.96	50	3.80
Identify storage problems that might occur & prevent spoilage	0	2	15	44	18	79	3.98	50	4.08
Use grain dryer & fans	3	12	23	26	15	79	3.48	49	3.48

	Use proper types of storage facilities	1	3	17	36	22	79	3.94	48	3.87
	Clean storage areas & prevent insects & rodents	0	1	10	42	23	76	4.13	47	4.00
13.	Evaluate Corn Varieties & Select Seed									
	Identify the parts of corn kernels & discuss functions of each part	6	14	42	13	2	77	2.88	49	3.06
	Identify advantages & disadvantages of special types of corn	1	2	27	43	5	78	3.62	49	3.59
	Read & evaluate the seed tag on a bag of corn	0	3	17	45	13	78	3.87	48	3.70
	Calculate the number of units (bags) of seed needed to plant a fixed acreage at various populations	0	1	13	51	13	78	3.97	49	3.77
	Evaluate performance potential of various corns using both public & commercial yield comparison & performance data	0	2	20	42	14	78	3.87	49	3.89
	Determine the maturity day rating for seed corns available	0	1	13	47	16	77	4.01	48	4.00
	Select seed corn for yield, harvest ability, soil adaptation, disease & insect resistance & standability	0	0	2	30	46	78	4.56	49	4.36
14.	Plan & Apply Corn Fertilizers									
	Describe the nutrient requirements for corn	0	1	12	32	26	78	4.15	48	3.89
	Determine applied cost per acre of various forms & analysis of fertilizing materials	0	1	12	44	21	78	4.08	48	3.93
	Prepare a balanced corn fertilizer program which includes kinds to apply, method of application, rate of application & cost	0	0	7	38	33	78	4.33	48	4.16
	Determine fertilization rates required for maximum return per fertilizer dollar	0	1	5	40	32	78	4.32	48	4.10
	Recognize the effect of nutrient levels & fertilizer placement on yield & quality of corn	0	1	9	47	21	78	4.12	48	4.00
	Describe the different methods of corn fertilizer application	0	6	19	43	10	78	3.73	47	3.63
	Identify nutrient deficiency symptoms in corn	0	1	14	42	21	78	4.06	47	4.06

15. Prepare Seedbed & Plant Corn									
Describe the characteristics of a good seedbed for corn	0	2	19	38	19	78	3.94	47	3.70
Compare the costs & returns of minimum & conventional tillage	0	0	20	46	14	80	3.92	49	3.52
Prepare a seedbed suitable for corn	0	0	6	37	37	80	4.38	49	3.77
Identify types of corn planters	2	2	35	31	9	79	3.54	48	3.16
Calendarize seed corn & planting date for desired harvest schedule	0	3	30	41	6	80	3.62	49	3.51
Describe the effect of planting date, row spacing, & plant population on yield	0	0	13	48	19	80	4.07	49	3.77
Calulate the actual planting rate required to achieve a desired harvest population with normal mortality	0	0	11	41	28	80	4.21	49	3.83
Prepare a corn planter to plant a desired population & apply fertilizer & insecticide at recommended rates using table on machine or in operators manual	0	0	5	36	39	80	4.42	49	3.87
Identify major stages of corn plant development	1	4	31	38	4	78	3.51	47	3.25
16. Harvest, Condition & Store Corn as Grain									
Determine when to harvest corn for high moisture storage, drying or crib	0	0	7	39	30	76	4.30	48	4.02
Determine moisture content of harvested corn	0	0	10	44	24	78	4.17	49	3.39
Calculate yield estimate within 10%	1	3	26	39	9	78	3.66	49	3.51
Calculate harvest machine loss & determine cause	0	1	13	37	27	78	4.15	49	3.85
Adjust harvest machine to reduce broken kernels & foreign material	0	0	9	38	31	78	4.28	49	4.04
Compare costs of alternative harvest, conditioning & storage systems	0	2	23	40	13	78	3.82	49	3.73
Compare costs, quality & capacity of various drying systems	2	4	26	36	9	77	3.59	49	3.53
Calculate the shrinkage when drying corn from field moisture to 14.5%	1	12	29	32	4	78	3.33	49	3.44
Calculate size of structure required to store a certain number of bushels of corn	0	4	25	42	7	78	3.66	49	3.42

Determine cost of storage for a specified amount of corn & length of storage period	0	7	26	31	12	76	3.63	48	3.47
17. Harvest & Store Corn as Silage									
Compare stage of corn maturity on feeding value of silage	5	3	13	33	25	79	3.88	49	4.02
Evaluate length of cut relative to silo capacity & feeding efficiency	4	5	11	45	13	78	3.74	48	3.81
Calcualte amount of water to add to properly ensile late season corn or stalks	5	7	23	35	9	79	3.45	49	3.51
Evaluate alternative methods of harvesting & utilizing stalks	2	4	29	39	4	78	3.50	49	3.67
18. Market Corn									
Determine costs of corn production & storage	0	4	19	37	17	77	3.87	49	3.87
Sample a load or bin of corn & determine moisture, test weight & BCFM (broken corn foreign material)	2	8	25	40	5	80	3.47	49	3.57
Determine local basis for corn	3	11	23	37	6	80	3.40	47	3.51
Determine cost of transportation to alternate markets	5	10	29	30	6	80	3.27	49	3.40
Compare hedging & cash market alternatives	7	10	33	28	2	80	3.10	49	3.38
Collect & interpret corn market information	4	8	29	30	9	80	3.40	49	3.44
Select the most profitable corn marketing strategies	3	8	18	28	17	74	3.64	49	3.67
19. Evaluate & Select Soybean Seed									
Identify the parts of the soybean seed & explain their function	8	2	5	20	0	17	2.05	44	2.79
Read & evaluate the seed tag on a bag of soybeans	6	2	3	3	0	14	2.21	45	3.24
Calculate the bags of seed required to plant a given acreage	6	2	1	5	0	14	2.35	45	3.15
Determine days to maturity of soybean varieties	6	2	1	4	1	14	2.42	44	3.31
Select soybean seed considering maturity, yield potential, disease resistance & standability	5	2	1	3	3	14	2.78	45	3.46

20. Plant Soybeans & Apply Nutrients									
Evaluate recent findings on time of planting, row width, spacing within the row & planting method	4	2	0	5	1	12	2.75	45	3.55
Calibrate planter for soybeans	4	2	0	2	4	12	3.00	45	3.57
Inoculate soybeans with rhizobium	4	2	2	2	2	12	2.66	45	3.31
Prepare a good seedbed for soybeans	4	2	0	2	4	12	3.00	45	3.40
Plant soybeans correctly	4	2	0	1	5	12	3.08	45	3.48
Calculate the rates of fertilizer to apply to get maximum return per fertilizer dollar	4	2	0	1	5	12	3.08	44	3.63
Plan & apply fertilizer as indicated by soil & tissue tests	4	2	0	1	4	11	2.90	44	3.65
21. Harvest, Condition & Store Soybeans									
Sample a field of soybeans & moisture test to determine time to harvest	2	0	0	3	2	7	3.42	43	3.39
Determine major sources of soybean harvest loss & the prodcedure in minimizing each loss	2	0	0	2	3	7	3.57	43	3.55
Make necessary adjustments on soybean harvesting equipment for efficient operation	2	0	0	1	4	7	3.71	43	3.55
Harvest soybeans with less than one bushel per acre field loss	2	0	0	3	2	7	3.42	43	3.60
Calculate cost of soybean storage & determine whether to store or market	2	0	0	2	3	7	3.57	43	3.65
Condition soybeans for market or storage to minimize damage & deterioration	2	0	1	2	2	7	3.28	43	3.58
22. Market Soybeans									
Determine costs of soybean production & storage	2	1	0	1	4	8	3.50	46	3.60
Sample a load or bin of soybeans & determine moisture, test weight, foreign material & splits	2	1	1	2	2	8	3.12	47	3.42
Locate markets for soybeans & determine basis & transportation costs for each	2	1	0	2	3	8	3.37	47	3.40
Market soybeans to best economic advantage	2	1	0	1	4	8	3.50	47	3.63

Agricultural Mechanics Cluster

This study revealed the importance of Agricultural Mechanics competencies in that the mean of the "Southwest" sample, for the fifteen duties, was (4.04) with a low of (3.64) whereas the mean of the "Statewide" sample was (4.10) with a low of (3.78). Both samples placed the same five duties in the first five positions although the rank varied. The rank order is that of the "Southwest" sample (mean value is in parenthesis) followed by the "Statewide" rank and mean.

RANK ORDER

1 Recognize the need for and practice machine safety (4.49), 1-(4.53)

2 Select, maintain, and operate harvesting machines (4.49), 4-(4.26)

3 Select, maintain and operate planting machines (4.25), 2-(4.43)

4 Select, maintain, and operate sprayers and fertilizer applicators (4.23), 3-(4.30)

5 Maintain hydraulic systems (4.17), 5-(4.21)

6 Select, maintain, and operate farm power units (4.09), 7-(4.14)

7 Select, maintain, and operate tillage machines (4.08), 8-(4.11)

(tie for 8th place)

8 Identify and locate essential maintenance information (4.02), 9-(4.09)

8 Maintain farm water systems (4.02), 9-(4.09)

8 Maintain and operate feed handling systems (4.02), 11-(4.02)

11 Identify and select lubricants and fuels (4.00), 6-(4.16)

12 Maintain agricultural buildings and structures (3.97), 14-(3.80)

(tie for 13th place)

13 Operate and update manure handling (3.70), 13-(3.82)

13 Identify tools, hardware, and machinery used on the farm (3.70), 15-(3.78)

15 Set up and maintain shop work are (3.64), 12-(3.85)

Twelve tasks were designated most important by the survey. The eleven that ranked highest in the "Southwest" sample are listed with their mean in parenthesis followed by the rank and mean from the "Statewide" sample. The task 11-2, "Identify safety hazards peculiar to choppers", ranked fifth in the "Statewide" sample with a mean of (4.54).

DUTY	TASK	
5	3	Check oil in engine and power train (4.62), 2-(4.57)
10	4	Select correct field travel and PTO speed for chemical applicator (4.61), 1-(4.59)
10	5	Select proper pressure for chemical and nozzle in use (4.58), 5-(4.54)
1	4	Install and maintain shields and guards (4.53), 23-(4.35)
5	12	Change oil (4.51), 4-(4.56)
15	13	Repair electrical shields and guards (4.50), ?-(4.00)
7	13	Grease equipment (4.50), 2-(4.57)
5	7	Locate and change transmission, fuel, and motor oil filters as indicated by the operator manual (4.47), 9-(4.45)
7	3	Check oil and coolant in power unit (4.46), 7-(4.47)
1	1	Identify potential safety hazards (4.41), 23-(4.35)
10	3	Select nozzle for specific type of sprayer and chemical use (4.41), 28-(4.33)

Complete results, for the two groups, by duty area and task follows:

TABLE 8

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS: AGRICULTURAL MECHANICS CLUSTER

U.S.O.E. Code 01.01 03 00 00 DOT Code: numerous

Knowledge of the design and principles of operation of advanced farm machinery and equipment plus skills in maintaining, operating, and repairing this heavy investment safely, are important to economical production of livestock and crops.

						SOUTHWEST		STATEWIDE	
	OF NO IMPORTANCE	OF LOW IMPORTANCE	OF MEDIUM IMPORTANCE	OF HIGH IMPORTANCE	OF EXTREME IMPORTANCE	N=80 TOTAL RESPONSES	MEAN	N=42 TOTAL RESPONSES	MEAN
DUTY AREAS									
1. Recognize the need for and practice machine safety	0	0	5	30	44	79	4.49	41	4.53
2. Identify and locate essential maintenance information	0	3	9	50	17	79	4.02	42	4.09
3. Identify tools, hardware and machinery used on the farm	0	5	24	41	10	80	3.70	42	3.78
4. Set up and maintain shop work area	0	3	31	36	9	79	3.64	42	3.85
5. Identify and select lubricants and fuels	0	0	19	41	19	79	4.00	42	4.16
6. Maintain hydraulic systems	0	0	9	46	23	78	4.17	42	4.21
7. Select, maintain and operate farm power units	0	0	12	45	19	76	4.09	42	4.14
8. Select, maintain and operate tillage machines	0	1	9	50	18	78	4.08	42	4.11
9. Select, maintain and operate planting machines	0	1	6	40	27	74	4.25	41	4.43
10. Select, maintain and operate sprayers and fertilizer applicators	0	1	10	39	31	81	4.23	42	4.30
11. Select, maintain and operate harvesting machines	0	0	6	43	29	78	4.29	42	4.26
12. Maintain and operate feed handling systems	0	2	11	45	17	75	4.02	42	4.02
13. Maintain farm water systems	1	5	12	34	27	79	4.02	42	4.09
14. Operate and update manure handling	0	2	26	44	7	79	3.70	41	3.82
15. Maintain agricultural buildings and structures	0	0	18	44	16	78	3.97	42	3.80

TASKS									
1. **Recognize The Need For and Practice Safety**									
Identify potential safety hazards	0	1	6	31	40	78	4.41	40	4.35
Use fire extinguishers	0	1	16	36	26	79	4.10	42	4.14
Keep flammable liquids in safe container	0	1	6	41	30	78	4.28	42	4.38
Install and maintain shields and guards	0	1	4	26	48	79	4.53	42	4.35
Remove debris from work areas	0	1	13	45	20	79	4.06	42	3.95
Identify 540 and 1000 RPM power shafts	2	3	22	40	12	79	3.72	42	3.69
Identify catagory I, II and III linkages	1	4	33	38	3	79	3.48	41	3.41
Use proper lifting, blocking & carrying methods	0	2	24	29	24	79	3.94	42	4.00
Ventilate areas where fumes collect	0	4	7	31	36	78	4.26	42	4.38
Interpret safety and operating instruction in operators manuals	0	1	12	40	25	78	4.14	42	4.28
Provide and use eye protection around shop work area	0	1	9	30	38	78	4.34	42	4.30
Use protective gear when welding	2	1	9	21	45	78	4.35	42	4.38
Identify ground wires and connectors in electrical systems	0	0	10	29	38	77	4.36	42	4.11
2. **Identify and Locate Essential Maintenance Information**									
Identify sections of an operation manual	2	9	34	31	2	78	3.28	42	3.28
Locate machine model and serial number	1	10	46	21	1	79	3.13	42	3.40
Locate trouble shooting information for machines	0	3	27	43	6	79	3.65	42	3.85
Maintain a suitable location for operators manuals	0	6	32	37	4	79	3.49	42	3.85
Locate engine hour meter, read the indicator & post to a maintenance schedule	1	4	33	31	10	79	3.56	42	3.83
Prepare simple sketches or drawings of farm repairs or building changes	7	23	35	12	1	78	2.70	41	3.00
3. **Identify Tools, Hardware and Machinery Used On the Farm**									
Identify common hand and power tools	5	13	35	22	3	78	3.24	41	3.41
Identify bolts & fasteners by size & grade	2	6	43	23	3	77	3.23	41	3.46

Identify belts and chains for size and type	0	10	33	24	5	72	3.33	41	3.43
Maintain working condition of tools	2	1	27	33	14	77	3.73	41	3.95
Identify major farm machines	4	11	30	30	5	80	3.26	41	3.43
Identify major parts of machines	2	7	21	36	7	73	3.58	41	3.65
Identify welding rod type and size	2	8	26	25	11	72	3.48	41	3.68
Identify common electrical wiring supplies for 120-140 volts to 100 AMPS	2	7	17	29	23	78	3.82	41	3.97
4. Set Up and Maintain Shop Work Area									
Locate a feasible area for hand and power tools, parts and supplies so they may be used efficiently	1	2	22	42	10	77	3.75	42	3.83
Provide a clean storage area for lubricants, grease guns and oil cans	0	2	36	32	9	79	3.60	42	4.04
Select shop tools for normal farm maintenance	0	3	29	40	7	79	3.64	41	3.82
Provide adequate electrical supply if welder is used	1	1	9	42	26	79	4.15	42	4.30
Provide suitable work area and ventilation for welding	1	2	13	47	16	79	3.94	42	4.09
5. Identify and Select Lubricants and Fuels									
Identify label designation on lubricating oils	0	5	18	39	17	79	3.86	42	4.16
Determine type of transmission in power units	1	1	19	46	12	79	3.84	42	3.69
Check oil in engine and power train	0	1	3	21	54	79	4.62	42	4.57
Compare greases for specific applications	0	4	25	41	9	79	3.69	42	3.83
Differentiate between motor oil and grease lubricants	0	2	18	38	21	79	3.98	42	3.95
Determine when hydraulic oil is required in power train	0	1	8	40	30	79	4.25	41	4.36
Locate and change transmission, fuel and motor oil filters as indicated by operators manual	0	1	4	30	43	78	4.47	42	4.45
Select proper fuel for gasoline or diesel power unit	0	1	14	20	43	78	4.34	42	4.45
Bleed air from diesel fuel line	1	1	27	29	20	78	3.84	42	4.19
Repack bearings	0	0	22	40	16	78	3.92	42	4.02
Refuel power units safety	0	2	14	37	25	78	4.08	42	4.23
Change oil	0	1	3	29	45	78	4.51	41	4.56

6. Maintain Hydraulic Systems									
Identify the major components of the hydraulic system	2	10	28	31	5	76	3.35	40	3.70
Check the hydarulic reservoir for oil level indicated in operators manual	0	1	8	39	33	79	4.29	42	4.40
Check and repair oil leaks	0	3	11	39	26	79	4.11	42	4.21
Check for air leaks that could contaminate oil	1	3	19	36	20	79	3.89	42	4.02
Identify type of oil required for hydraulic system	0	0	13	35	30	78	4.21	41	4.39
Connect hydraulic cylinders and hoses	1	4	30	31	13	79	3.64	42	3.88
Connect hydraulic motors	4	4	28	32	10	78	3.51	41	3.80
7. Select, Maintain and Operate Farm Power Units									
Identify makes and models of tractors	4	16	28	19	7	74	3.12	40	3.27
Compare tractors for specific farm applications (horse power, pto speed, hydraulic system)	0	5	27	36	8	76	3.61	42	3.64
Check oil and coolant on power unit	0	2	4	27	43	76	4.46	42	4.47
Locate the items which need routine service and determine the interval at which service should be performed	0	1	14	33	27	75	4.14	42	4.30
Remove, service and install battery	1	2	31	31	11	76	3.64	42	3.85
Adjust, remove or replace fan & generator belts	1	5	30	31	9	76	3.55	42	3.92
Add coolant to radiators	0	6	14	33	23	76	3.96	42	4.28
Add oil to equipment	0	4	5	33	34	76	4.27	42	4.35
Adjust carburetors	1	7	31	26	11	76	3.51	42	3.71
Adjust clutch pedal free travel	0	4	20	36	16	76	3.84	41	3.95
Change thermostats	4	9	34	26	3	76	3.19	42	3.59
Clean debris from equipment	1	6	26	30	13	76	3.63	42	3.64
Grease equipment	0	1	4	27	44	76	4.50	42	4.57
Inflate tires	1	5	14	43	13	76	3.81	42	4.00
Inspect cooling system for leaks	0	4	19	37	16	76	3.85	42	3.95
Interpret gauge readings on equipment	0	4	9	42	21	76	4.05	42	4.16
Operate equipment and vehicles on public highways	2	5	21	24	23	75	3.81	41	4.12
Add wheel and front end weights	2	10	24	30	10	76	3.47	42	3.69
Connect front end operated equipment	2	9	32	29	3	75	3.29	40	3.55
Connect hydraulic systems and hydraulic operated equipment	1	8	25	36	6	76	3.50	41	3.70

Connect 3-point hitch equipment	1	7	26	35	7	76	3.53	41	3.73
Hitch towed equipment	1	11	21	30	13	76	3.56	41	3.75
Remove equipment from storage	3	13	41	16	3	76	3.03	42	3.40
Repack bearings	0	4	23	37	12	76	3.75	40	3.80
Replace and adjust spark plugs	0	4	22	44	6	76	3.68	42	3.88
Replace bearings and seals	1	5	24	37	9	76	3.63	41	3.85
Replace spark plug wires	2	5	28	36	5	76	3.48	41	3.58
Replace radiator hoses	0	6	25	37	8	76	3.61	42	3.76
Replace universal joints	2	9	21	36	7	75	3.49	42	3.66
Service air cleaners	1	2	10	35	27	75	4.13	42	4.35
Service fuel strainer, fuel filters, and sediment bowl on gas fuel system	0	1	11	36	28	76	4.19	41	4.26
Time engine	1	10	27	29	9	76	3.46	41	3.87
Prepare equipment for storage	0	6	32	32	6	76	3.50	41	3.78
Back a two wheel implement	3	14	23	26	10	76	3.34	41	3.48
Adjust brakes	0	6	20	35	14	75	3.76	42	3.73
8. Select, Maintain and Operate Tillage Machines									
Compare moldboard plows, chiselplow and disc for tillage operations	0	55	22	42	10	79	3.72	41	3.75
Identify major parts of tillage machines	2	11	26	36	4	79	3.36	41	3.43
Determine adjustments to reduce side draft on plow	0	6	19	41	14	80	3.78	42	3.88
Connect tillage equipment to tractor	3	7	28	34	8	80	3.46	42	3.80
Adjust angle of disc gangs	1	10	23	37	9	80	3.53	42	3.54
Remove and replace soil worn parts (shares, coulters, disc blades, shovels)	0	2	25	34	16	77	3.83	41	4.00
Lubricate bearings and wear points	0	3	8	35	31	77	4.22	42	4.21
"Layout" field for plowing	0	0	28	35	14	77	3.81	42	3.80
Identify types of cultivators and secondary tillage machines	0	9	42	23	3	77	3.25	42	3.38
Compare machines for application to soil, horsepower, and acreage	0	4	29	40	4	77	3.57	41	3.68
Operate and adjust secondary tillage machines and cultivators	1	4	25	43	4	77	3.58	42	3.52
Prepare tillage machine for storage	1	9	30	26	5	71	3.35	40	3.40

9. Select, Maintain and Operate Planting Machines									
Compare types of planting machines	0	5	29	35	5	74	3.54	40	3.67
Determine metering adjustment for seed, fertilizer and pesticides	0	0	7	34	33	74	4.35	41	4.46
Adjust planter drive, plates or sprockets to operators manual specifications	0	1	6	34	33	74	4.33	41	4.41
Lubricate planting machine	0	0	9	35	30	74	4.28	41	4.36
Clean and store planting machine	0	0	15	36	22	73	4.09	39	4.20
10. Select, Maintain and Operate Sprayers and Fertilizer Applicators									
Identify major parts of a sprayer system	0	2	25	42	12	81	3.79	41	3.87
Compare types of sprayer pumps	0	5	25	42	9	81	3.67	42	3.66
Select nozzles for specific type of sprayer and chemical used	0	0	4	39	38	81	4.41	42	4.33
Select correct field travel and P.T.O. speed for chemical application	0	0	4	23	54	81	4.61	42	4.59
Select proper pressure for chemical and nozzle in use	0	0	3	28	50	81	4.58	42	4.54
Clean nozzles properly	0	0	9	36	34	79	4.31	42	4.30
Flush and clean sprayer	0	0	8	41	30	79	4.27	42	4.28
Adjust fertilizer applicator rate	0	0	5	38	35	78	4.38	41	4.29
11. Select, Maintain and Operate Harvesting Machines									
Check and adjust chopper shear bar and knives	1	2	4	29	40	76	4.38	42	4.45
Identify safety hazards peculiar to choppers	0	1	5	33	38	77	4.40	42	4.54
Maneuver tractors, chopper and wagons under field conditions	1	4	13	37	21	76	3.96	41	4.00
Sharpen chopper knives as outlined in operators manual	0	2	11	31	33	77	4.23	42	4.35
Identify & lubricate bearings & wear points	0	1	7	42	28	78	4.24	42	4.30
Remove and replace knife sections or assembly	0	3	13	42	19	77	4.00	42	4.09
Adjust mower/conditioner or haybine	0	1	10	55	12	78	4.00	42	4.04
Adjust safety clutches	0	2	11	43	21	77	4.07	42	4.00

Operate and lubricate haybine	0	3	5	46	24	78	4.16	42	4.19
Lubricate baler	0	2	7	45	24	78	4.16	42	4.16
Install twine & check knotter & plunger	0	3	18	40	17	78	3.91	41	3.92
Replace shear pins	0	3	24	36	15	78	3.80	42	3.80
Adjust bale density	2	4	23	37	12	78	3.67	42	3.78
Clear plugged baler safely	1	3	11	34	29	78	4.11	42	4.19
Set up combine for specified crop	1	2	8	35	32	78	4.21	42	4.38
Identify type of loss or damage from combine	1	2	10	40	25	78	4.10	42	4.16
Adjust combine to reduce field loss or damage	1	1	7	31	36	76	4.31	42	4.42
Lubricate combine	1	2	6	33	33	75	4.26	42	4.40
12. Maintain and Operate Feed Handling Systems									
Select and install feed handling equipment	1	5	27	36	7	76	3.56	42	3.78
Operate feeding equipment	0	1	28	37	10	76	3.73	42	3.85
Calculate electrical load and determine line size for additional equipment	0	8	15	33	20	76	3.85	42	3.73
Install and replace meters and belts on feed augers and conveyors	0	5	21	43	7	76	3.68	42	3.80
Compare conventional and big bale hay systems for your operation	1	11	38	23	2	75	3.18	41	3.26
13. Maintain Farm Water Systems									
Install livestock waterers	3	5	22	35	14	79	3.65	42	3.92
Clean and adjust float in waterer	2	4	16	40	18	80	3.85	42	3.88
Replace valves in water lines	2	9	20	38	11	80	3.58	41	3.73
Cut and repair PVC and METAL water lines	2	10	30	34	4	80	3.35	40	3.50
Remove and replace automatic heater elements	8	9	22	39	10	80	3.62	42	3.61
Provide safe and clean watering facilities from farm ponds or springs	5	9	19	36	11	80	3.48	41	3.60
Identify types of pumps and compare advantages and limitations	1	12	25	37	5	80	3.41	42	3.54
14. Operate and Update Manure Handling									
Determine alternative waste handling systems for a specific farm	0	7	29	39	4	79	3.50	41	3.63
Describe the difference between aerobic and anaerobic treatment systems	4	12	38	22	2	78	3.07	40	3.20

	Identify causes of odor in a waste system and suggest controls	2	12	31	30	4	79	3.27	40	3.35
	Identify causes of system failure in pit systems	5	10	28	29	7	79	3.29	40	3.40
	Compare type of manure holding areas for cost and benefits	2	6	24	36	11	79	3.60	41	3.65
	Estimate the value of animal waste for fertilizer	1	2	23	35	18	79	3.84	41	3.92
	Divert waste runoff from streams or public areas	1	3	13	35	25	77	4.03	41	4.21
15.	Maintain Agricultural Buildings and Structures									
	Calculate the capacity of a building for various livestock	0	2	16	43	15	76	3.93	36	4.02
	Apply wood and metal preservations	0	10	23	39	6	78	3.52	39	3.74
	Clean and oil electric motors on structures	0	2	19	43	14	78	3.88	41	4.02
	Build and remove concrete forms	1	13	42	17	5	78	3.15	40	3.40
	Determine cost of repairs	0	4	25	39	9	77	3.68	41	3.87
	Develop bill of materials needed for repairs	1	5	38	25	6	75	3.40	39	3.53
	Repair and hang gates and doors	0	7	19	44	8	78	3.67	41	3.53
	Install electric motors	0	7	30	35	6	78	3.51	41	3.53
	Lay concrete blocks	5	22	39	11	1	78	2.75	39	3.07
	Mix, pour, finish, and cure concrete	0	15	36	21	6	78	3.23	41	3.29
	Read and interpret blueprints	9	14	27	20	6	76	3.00	39	3.33
	Install and repair bracing in buildings and structures	0	10	28	32	8	78	3.48	39	3.61
	Repair electrical cords and broken wires	1	2	15	34	26	78	4.50	41	4.00
	Repair minor leaks in roof of buildings	2	2	22	44	8	78	3.69	41	3.65
	Replace belts and pulleys	0	4	26	38	10	78	3.69	41	3.78
	Reset circuit breakers	2	6	18	33	19	78	3.78	40	3.85
	Install and replace electrical switches	1	5	22	37	13	78	3.71	41	3.80
	Replace fuses	1	8	16	31	22	78	3.83	40	4.00
	Replace lighting fixtures	0	8	24	38	8	78	3.58	41	3.73
	Replace window panes	1	11	22	37	7	78	3.48	41	3.63
	Wire simple electrical circuit	1	5	23	39	10	78	3.66	41	3.65
	Construct and repair fences and gates	0	5	19	35	19	78	3.87	41	3.78
	Install and repair wood siding on buildings	1	5	36	22	4	78	3.16	40	3.42
	Repair metal structures, with arc or oxy-acetylene welder	3	17	27	27	4	78	3.15	41	3.48

Farm Business Management Cluster

Duties in the Farm Business Management cluster are ranked by the mean determined by the "Southwest" sample (listed in parenthesis) followed by the rank and mean designated by the "Statewide" sample.

RANK ORDER

1 Finance farm operations (4.64), 4-(4.14)

2 Manage farm to maximize long term production and profitability (4.58), 2-(4.31)

3 Record and maintain production records (4.45), 3-(4.19)

4 Plan and implement livestock production programs (4.44), 5-(4.12)

5 Record and utilize farm business transactions (4.37), 1-(4.36)

6 Plan and implement crop production programs (4.25), 6-(4.06)

7 Identify personal and economic goals (4.20), 6-(4.06)

8 Marketing agricultural products (4.15), 9-(3.79)

9 Plan the farm equipment and machinery program, buildings, and structures (4.08), 8-(3.80)

10 Continue personal development (4.05), 10-(3.72)

11 Observe legal requirements and regulations (3.87), 12-(3.46)

12 Function as a purchasing agent (3.75), 11-(3.58)

13 Interview, hire, and manage labor (3.53), 13-(3.08)

The Farm Business Management tasks of highest importance in the "Southwest" sample (in parenthesis) are listed in rank order. The rank and mean of the "Statewide" sample follow:

DUTY	TASK	
6	11	Evaluate loan repayment capacity (4.74), 7-(4.20)
2	2	Establish and maintain a bank account (4.69), 3-(4.36)
2	1	Enter receipts and expenses in a farm account book (4.65), 2-(4.42)
6	1	Prepare net worth statement (4.64), 11-(4.18)
9	4	Maintain breeding records (sires, service dates and due dates) (4.60), 1-(4.63)
6	8	Evaluate importance of good credit ratings (4.59), 31-(4.04)
5	20	Determine where to locate buildings and structures (4.56), 26-(4.06)
12	3	Follow legal procedure for purchasing land (4.53), 12-(4.17)
6	5	Develop budget to determine if it will pay to borrow money (4.45), 5-(4.22)
6	10	Evaluate loan repayment terms and conditions (4.41), 22-(4.08)
12	5	Identify the rights and liabilities of tenants and landlords (4.41), ?-(3.78)
13	5	Identify and analyze problems which affect personal or family goals (4.41), 14-(4.14)

Complete result, for the two survey groups, by duty area and task follows:

TABLE 9

COMPETENCIES REQUIRED OF BEGINNING FARM OPERATORS: FARM BUSINESS MANAGEMENT CLUSTER
U.S.O.E. Code 01.01 04 00 00 DOT Code 409.168

Many of the competencies in farm business management are required in production of dairy, meat animals and crops. This cluster of duties tend to identify personal and economic goals, coordinate resources, direct actions, and evaluate achievements in farm operations.

						SOUTHWEST		STATEWIDE	
DUTY AREAS	OF NO IMPORTANCE	OF LOW IMPORTANCE	OF MEDIUM IMPORTANCE	OF HIGH IMPORTANCE	OF EXTREME IMPORTANCE	N=80 TOTAL RESPONSES	MEAN	N=49 TOTAL RESPONSES	MEAN
1. Identify personal & economic goals	0	0	14	33	30	77	4.20	47	4.06
2. Record & utilize farm business transactions	2	0	8	25	43	78	4.37	49	4.36
3. Plan & implement crop production programs	0	1	6	43	28	78	4.25	47	4.06
4. Plan & implement livestock production programs	0	0	3	37	38	78	4.44	48	4.12
5. Plan the farm equipment & machinery program, building & structures	0	0	16	40	23	79	4.08	47	3.80
6. Finance farm operations	0	0	3	22	54	79	4.64	47	4.14
7. Manage farm to maximize long term production & profitability	0	1	1	27	49	78	4.58	47	4.31
8. Function as purchasing agent	1	3	23	38	13	78	3.75	48	3.58
9. Record & maintain production records	0	1	7	26	45	79	4.45	47	4.19
10. Marketing agricultural products	0	5	8	34	30	77	4.15	49	3.79
11. Interview, hire & manage labor	2	6	27	34	9	78	3.53	47	3.08
12. Observe legal requirements & regulations	1	2	24	30	21	78	3.87	47	3.46
13. Continue personal development	1	1	16	35	25	78	4.05	48	3.72

TASKS									
1. Identify Personal & Economic Goals									
Determine personal interests, desires, & goals	0	2	10	40	24	76	4.13	46	4.02
Examine alternative means of attaining personal desires & goals	1	3	12	50	10	76	3.85	48	3.60
Establish priorities for utilization of resources	0	1	17	42	15	75	3.94	48	3.83
2. Record & Utilize Farm Business Transactions									
Enter receipts & expenses in a farm account book	0	1	2	20	55	78	4.65	49	4.42
Establish, & maintain a bank account	1	1	0	17	60	79	4.69	47	4.36
Develop file system for receipts, invoices, & bills	0	6	18	23	30	77	4.00	49	4.06
Develop & maintain a depreciation schedule	1	1	18	28	30	78	4.08	49	4.28
Gather information & prepare both WI & federal income tax return	3	8	22	19	27	79	3.74	49	3.97
Develop income tax management strategies	0	3	18	29	29	79	4.06	49	4.16
Calculate investment credit	0	10	24	29	16	79	3.64	49	3.93
Take & maintain a farm business inventory	1	1	26	31	20	79	3.86	49	3.91
Analyze strengths & weaknesses of the farm business	0	1	13	27	37	78	4.28	49	4.12
Analyze profitability of each farm enterprise (profit & loss statement)	0	2	8	36	32	78	4.25	49	3.97
Plan a yearly budget in advance of season	2	12	27	24	11	76	3.39	47	3.46
3. Plan & Implement Crop Production Programs									
Determine amount of crops to be grown	0	1	16	46	16	79	3.97	47	4.10
Determine crop enterprises for the farm	0	2	17	36	24	79	4.03	48	4.02
Determine crop rotations to be followed	0	3	15	42	18	78	3.96	48	3.95
Determine whether to expand or reduce crop acreages	1	2	23	42	11	79	3.75	48	3.83
Develop crop budgets	1	9	37	27	5	79	3.32	48	3.37
Develop crop production schedule for farm	2	6	30	34	7	79	3.48	47	3.59
Establish crop production goals	0	3	21	45	9	78	3.76	48	3.91
Identify resources available for crop program	0	5	29	34	11	79	3.64	48	3.66

Identify special production practices needed to attain production goals	0	2	8	45	24	79	4.15	48	3.85
Identify ways to increase crop efficiency	0	0	8	42	29	79	4.26	47	4.04
Identify resources needed for the crop program	0	3	18	44	14	79	3.87	47	3.93
Plan field layout	0	5	23	28	23	79	3.87	48	3.62
Determine cost of producing grains & forage	0	1	13	46	18	78	4.03	48	3.93
4. Plan & Implement Livestock Production Program									
Determine amount of feed to be purchased in addition to home grown feeds	1	2	16	39	20	78	3.96	48	4.00
Determine resources needed for livestock program	0	3	10	52	14	79	3.97	48	3.97
Determine the amount of livestock for the farm	0	4	10	41	24	79	4.07	48	3.89
Determine the grade of livestock for the farm	0	2	16	37	24	79	4.05	48	3.68
Determine whether to expand or reduce the livestock enterprises	0	1	10	43	25	79	4.16	48	3.77
Develop livestock planning budgets	0	4	26	39	10	79	3.69	47	3.40
Establish livestock enteprise production goals	0	1	13	42	23	79	4.10	48	3.89
Identify resources available for the livestock enteprises	0	7	27	42	3	79	3.51	48	3.62
Identify special production practices needed to attain production goals	0	2	10	38	29	79	4.18	48	4.00
Identify ways to increase the efficiency of the livestock program	0	0	5	39	35	79	4.37	46	4.10
Determine the type of livestock for the farm	0	3	17	40	19	79	3.94	48	3.91
Develop livestock budgets	0	5	34	34	6	79	3.51	46	3.39
Determine cost of production for each product unit	1	4	15	38	18	76	3.89	48	3.68
5. Plan the Farm Equipment & Machinery Program, Building & Structures									
Calculate equipment operation costs	0	3	27	36	12	78	3.73	47	3.48
Determine current conditions of machinery & equipment	0	1	15	52	11	79	3.92	47	3.80
Determine size of machinery & equipment to be purchased	0	1	7	46	25	79	4.20	47	4.10

Determine what machinery & equipment is needed	0	2	6	48	23	79	4.16	47	4.06
Determine whether to do custom work for others	7	20	32	15	5	79	2.88	47	3.10
Determine whether to own machinery or lease it	5	4	24	35	11	79	3.54	47	3.57
Determine whether to own equipment needed or hire custom work done	0	4	19	41	15	79	3.84	47	3.68
Identify equipment repairs needed	0	1	16	35	27	79	4.11	47	3.91
Determine whether to repair equipment or hire work done	0	6	18	40	15	79	3.81	47	3.61
Determine whether to repair or trade-in equipment & machinery	0	0	12	46	21	79	4.11	47	3.80
Determine whether to purchase new or used machinery & equipment	0	1	12	46	19	78	4.06	47	3.68
Determine returns expected from equipment & machinery investments	0	4	26	37	12	79	3.72	47	3.63
Develop regular equipment machinery maintenance schedule	1	3	24	30	21	79	3.84	47	3.85
Calculate construction, remodeling & repair costs	0	5	20	36	18	79	3.84	47	3.55
Determine returns expected from building investments	0	6	21	35	17	79	3.79	47	3.57
Determine size of buildings & structures needed	0	3	11	32	33	79	4.20	47	3.87
Determine whether permanent or temporary structures should be constructed	2	4	13	49	11	79	3.79	47	3.46
Determine whether single purpose or multiple purpose buildings are needed	1	3	19	42	14	79	3.82	47	3.53
Determine whether to remodel or replace current buildings & structures	0	3	15	41	20	79	3.98	47	3.65
Determine where to locate buildings & structures	0	1	7	17	54	79	4.56	47	4.06
Estimate future building & structure needs	1	5	16	33	24	79	3.93	47	3.74
Evaluate advantages & disadvantages of specific kinds & types of buildings & structures	1	4	15	29	30	79	4.05	46	3.82
Select mechanical systems for use in buildings	0	5	15	34	13	67	3.82	26	3.69
6. Financing Farm Operations									
Prepare net worth statement	0	0	3	22	54	79	4.64	48	4.18
Calculate interest rates	1	3	14	35	25	78	4.02	48	4.02

Determine amount of credit needed	0	2	15	36	26	79	4.08	48	4.20
Determine length of loan needed	0	1	11	34	33	79	4.25	48	4.10
Develop budget to determine if it will pay to borrow money	0	0	7	29	43	79	4.45	48	4.22
Develop cash flow budget & debt repayment schedule	0	2	6	29	42	79	4.40	48	4.20
Develop overall credit plan needed for farm	0	2	11	34	32	79	4.21	48	4.22
Evaluate importance of good credit ratings	0	1	4	21	53	79	4.59	48	4.04
Evaluate interest terms on loans	0	3	8	38	30	79	4.20	48	3.89
Evaluate loan repayment terms & conditions	0	3	2	33	41	79	4.41	48	4.08
Evaluate repayment capacity	0	1	0	17	61	79	4.74	48	4.20
Identify & evaluate various sources of credit	0	2	14	36	27	79	4.11	48	3.79
Identify factors which influence credit ratings	0	1	21	36	21	79	3.97	48	3.70
Identify purposes for which credit is needed	0	1	11	35	32	79	4.24	48	3.77
Identify the credit strengths & weaknesses of the farm business	0	2	7	31	38	78	4.34	48	3.75
Negotiate for required financing	0	0	13	35	29	77	4.20	48	3.85
7. Manage Farm to Maximize Long Term Production & Profitability									
Determine the type of farm to be developed	0	3	9	37	29	78	4.17	48	3.85
Determine the size of farm to be developed	0	2	17	41	19	79	3.97	48	3.87
Determine whether to have ownership or rent	0	1	8	34	36	79	4.32	48	3.75
Determine whether to participate in government programs	2	12	36	26	3	79	3.20	48	3.35
Determine whether to specialize or diversify	0	2	14	43	20	79	4.02	48	3.54
Develop overall farm plan	0	3	6	39	31	79	4.24	48	4.02
Identify improvements to be made	0	0	18	43	18	79	4.00	48	3.81
Evaluate lease & rental agreements	0	3	10	35	31	79	4.18	48	3.70
Determine amount of capital available for securing land	0	1	10	31	37	79	4.31	48	3.95
Determine amount of land needed	0	2	10	43	24	79	4.12	48	4.08
Identify available land	0	4	18	42	15	79	3.86	48	3.77
Determine if the land available fits the future farm plan	0	1	7	37	34	79	4.31	47	4.08
Evaluate land prices	0	2	12	23	42	79	4.32	48	4.10
Determine when to buy land	0	2	15	26	36	79	4.21	47	3.98

Identify factors that will influence utilization of available land	0	1	13	45	20	79	4.06	48	3.81
Make an appraisal of the land & buildings	0	1	10	36	31	78	4.24		3.81
8. Function as Purchasing Agent									
Determine what to order	1	2	13	40	22	78	4.02	49	3.89
Determine when to order	1	1	13	47	15	77	3.96	49	3.89
Compare costs & quality of products from various sources	0	0	10	39	29	77	4.24	49	3.91
Determine amount of supplies to keep on hand	0	4	29	37	8	78	3.62	49	3.44
Identify sources of supplies	0	9	34	27	8	78	3.43	49	3.48
Evaluate future supply needs	0	3	25	42	8	78	3.70	4	3.48
Evaluate advantages & disadvantages of specific types & brands of equipment & machinery	0	4	22	28	24	78	3.92	48	3.50
Evaluate possibility of joint ownership of equipment & machinery	1	8	28	23	18	78	3.62	48	3.41
Negotiate purchase of machinery, equipment, feed, & other resources	0	1	12	44	20	77	4.07	48	3.77
Determine the amount of insurance needed	0	2	8	41	26	77	4.18	48	4.00
Determine the kind & type of insurance needed	0	3	8	41	25	77	4.14	48	4.00
Determine what to insure	0	1	14	43	19	77	4.03	48	3.85
Determine when to insure	0	1	18	42	16	77	3.94	48	3.70
Evaluate advantages & disadvantages of insurance plans	0	2	12	42	21	77	4.06	47	3.74
Identify sources of insurance	0	6	20	41	6	73	3.64	47	3.76
9. Record & Maintain Production Records									
Measure or weigh production of livestock	0	2	8	39	30	79	4.22	46	4.10
Identify official performance recording agencies (DHI, Beef Improvement, etc.)	0	4	10	33	32	79	4.17	46	3.93
Calculate or weigh crop yields	0	1	18	47	13	79	3.91	46	3.84
Maintain breeding records (sires, service dates, & due dates)	1	0	3	21	54	79	4.60	47	4.63
Calculate measures of production efficiency	0	1	9	42	27	79	4.20	47	4.02
Compare performance with local standards	2	6	28	39	4	79	3.46	47	3.44

10. Marketing Agricultural Products									
Identify sources of marketing information	0	3	26	38	12	79	3.74	47	3.55
Secure & interpret market information	0	5	21	36	17	79	3.82	48	3.70
Determine cost of production for all products & services	0	1	15	47	16	79	3.98		3.79
Calculate expected returns & profits on sales	0	2	7	53	17	79	4.07		3.93
Determine feasibility of participating in futures market	3	19	35	16	6	79	3.03		3.33
Develop marketing strategies for each product	0	1	30	32	16	79	3.79	47	3.42
Develop marketing plans with alternatives	0	4	23	37	15	79	3.79		3.46
Determine reliability of potential markets	0	2	17	34	26	79	4.06		3.63
Select markets	0	1	12	49	17	79	4.03		3.76
Determine when products are ready for markets	0	1	6	39	34	79	4.35		3.85
Sell product at profit above production cost	0	1	7	31	39	78	4.38	41	4.04
Assist in decision development of marketing agencies	0	7	34	32	5	78	3.44	43	3.27
11. Interview, Hire & Manage Labor									
Plan work schedules	1	1	14	44	19	79	4.00	48	3.66
Establish priorities on work to be completed	0	1	8	38	32	79	4.27	48	3.91
Identify peak labor periods	0	0	15	43	21	79	4.07	48	3.87
Determine amount of labor needed	0	2	17	41	19	79	3.97	48	3.72
Evaluate influence labor utilization has on farm income	0	1	11	42	25	79	4.15	48	3.62
Identify ways to reduce inefficient use of labor	0	0	11	42	26	79	4.18	48	3.75
Determine whether to hire more labor or hire custom services	0	1	21	37	20	79	3.96	48	3.39
Determine whether to do work yourself or hire it done	1	1	16	40	21	79	4.00	48	3.58
Identify labor pool available	2	5	36	32	4	79	3.39	48	3.10
Determine qualifications needed for work to be performed	1	2	16	40	20	79	3.96	48	3.37
Interview qualified prospects	2	7	21	35	14	79	3.65	48	3.20
Hire or terminate workers as needed	2	4	21	34	18	79	3.78	48	3.12
Train workers to perform tasks	2	2	13	33	29	79	4.07	48	3.35
Evaluate workers performance	1	0	11	45	22	79	4.10	48	3.41
Assign specific responsibilities to workers	1	1	11	44	22	79	4.07	48	3.31

Establish pay scale & benefits for workers	1	0	21	37	20	79	3.94	48	3.37
Maintain required records both state & federal	1	1	12	30	35	79	4.22	47	3.46
Secure applicable Dept. of Labor, O.S.H.A., Social Security & Workmens Compensation information	2	4	20	28	25	79	3.88	47	3.94
Familiarize employee of provisions & requirements of agencies	1	6	32	31	9	79	3.51	47	3.08
Handle complaints & problems with tact	0	1	13	30	34	78	4.24	45	3.62
12. Observe Legal Requirements & Regulations									
Determine when to consult lawyers & specialist	0	5	10	43	21	79	4.01	47	3.76
Evaluate the regulations of various government programs	1	4	25	40	9	79	3.65	46	3.43
Follow legal procedures for purchasing land	0	0	4	29	46	79	4.53	47	4.17
Identify the property rights of owners	0	0	6	38	35	79	4.36	47	3.87
Identify the rights & liabilities of tenants & landlords	0	0	5	36	38	79	4.41	47	3.78
Interpret regulations regarding operation of vehicles by minors	0	2	9	34	34	79	4.26	47	3.72
Identify agencies with authority to influence your operation (DNR, EPA, etc.)	6	2	21	29	21	79	3.72	46	3.58
Obtain licenses or permits as required by regulations	0	1	12	40	25	78	4.14	41	3.73
13. Continue Personal Development									
Acquire new occupational skills & information to keep pace with technological advancements	0	0	12	37	30	79	4.22	47	4.06
Participate in training meetings & workshops	0	1	22	38	18	79	4.22	47	4.06
Communicate with industry & government leaders for information & policy development	1	3	30	31	14	79	3.68	48	3.77
Develop & maintain a working relationship with agricultural agencies, business & professionals	0	2	18	35	24	79	4.02	48	3.95
Identify & analyze problems which affect personal or family goals	0	0	6	34	39	79	4.41	48	4.14
Work with appropriate leaders to effect desirable changes in industry & community	0	1	15	46	17	79	4.00	48	3.83

PERFORMANCE LEVEL STUDY

The performance levels for job entry were determined in terms of the degree of outside assistance needed to perform the duty. A Likert-type scale, with the following values, was used:

OUTSIDE ASSISTANCE REQUIRED	1
GREAT NEED FOR OUTSIDE ASSISTANCE	2
OUTSIDE ASSISTANCE NEEDED BUT NOT ESSENTIAL	3
LITTLE NEED FOR OUSIDE ASSISTANCE	4
OUTSIDE ASSISTANCE NOT REQUIRED	5

The information gathered in the survey on performance levels validates the hypothesis that farmers must perform in a managerial or supervisory capacity. The data shows that, for a large majority of the duties, farmers require little outside or off-the-farm assistance. Approximately 4 out of 5 duty areas (80.8%) rated a mean value of 3.50 or higher (a rank of 5.0 indicates that outside assistance is not required). The data shows the following breakdown by mean value:

Mean	No. Responses By Duty Area	Percentage
5.00 - 4.50	15	19.23%
4.49 - 4.00	32	41.02%
3.99 - 3.50	16	20.51%
3.49 - 3.00	10	12.82%
2.99 - Below	5	6.42%
	78	100.00%

The performance level required of a farmer is reported by duty area with the mean value for each duty listed in parenthesis. The top ranked duties, those requiring the least amount of outside assistance, for each of the five clusters are indicated on the following (pp. 80-81). Data contained in Table 10 (p. 82) reveal that some duties require a need for outside assistance, such as "assembling and installing dairy operation equipment," "Plan and carry out soil nutrient program for forages," "Identify and control major crop pests," "Market soybeans," and "Finance farm operations."

RANK ORDER	Dairy Cluster:
1	Follow general safety practices (4.77)
2	Milking cows (4.68)
3	Sanitizing and maintaining milking equipment (4.41)
4	Handling and caring for dairy cattle (4.23)
4	Handling and utilizing animal wastes (4.23)
5	Breeding cows and heifers (4.00)

RANK ORDER	Livestock Production Cluster - Swine:
1	Disposing of animal waste (swine) (4.88)
2	Selecting swine breeding or feeder stock (4.29)
2	Marketing and shipping hogs (4.29)
3	Handling and caring for animals (swine) (4.18)
3	Maintain swine building and equipment (4.18)
4	Breeding sows and gilts (4.11)

RANK ORDER	Livestock Production Cluster - Beef:
1	Handling and treating beef cattle (4.32)
2	Maintaining beef cattle buildings and equipment (4.26)
3	Selecting beef breeding of feeder cattle (4.16)
4	Marketing and shipping beef cattle (4.11)

RANK ORDER	Crop Production Cluster:
1	Harvest and store small grain (4.67)
1	Plan and apply corn fertilizers (4.67)
2	Establish small grain plantings (4.63)
2	Fertilize small grains (4.63)
2	Prepare seedbed and plant corn (4.63)
3	Harvest, condition, and store corn as grain (4.58)

RANK ORDER	Crop Production Cluster (cont.)
5	Establish forage seedings (4.46)
5	Harvest and store corn as silage (4.46)

RANK ORDER	Agricultural Mechanics Cluster:
1	Identify tools, hardware and machinery used on the farm (4.88)
2	Recognize the need for and practice machine safety (4.71)
3	Set up and maintain shop work area (4.67)
4	Maintain and operate feed handling systems (4.50)
5	Select, maintain and operate farm power units (4.42)
5	Select, maintain and operate planting machines (4.42)
6	Select, maintain and operate tillage machines (4.38)
7	Identify and select lubricants and fuels (4.25)

RANK ORDER	Farm Business Management Cluster:
1	Continue personal development (4.54)
2	Interview, hire and manage labor (4.33)
3	Identify personal and economic goals (4.29)
4	Plan and implement livestock production programs (4.13)
5	Plan and implement crop production programs (4.00)

Complete survey results on performance levels for each duty area, follows:

TABLE 10

FARM OPERATOR COMPETENCIES - PERFORMANCE LEVELS

	Outside Assist. Not Required	Little Need For Outside Assist.	Outside Assist. Necessary But Not Essential	Great Need For Outside Assist.	Outside Assist. Required	Total	Mean Of Performance Levels
DUTY AREAS - DAIRY CLUSTER							
1. Observing legal requirements in dairy operations	7	4	8	2	1	22	3.64
2. Selecting breeding cows and replacement stock	9	5	4	3	1	22	3.82
3. Breeding cows and heifers	10	3	8	1	0	22	4.00
4. Formulating rations and feeding dairy cattle	4	6	7	5	0	22	3.41
5. Maintaining dairy herd health	2	3	12	3	2	22	3.27
6. Maintaining dairy buildings and structures (may include planning & construction)	3	8	7	4	0	22	3.45
7. Handling and caring for dairy cattle	10	9	2	0	1	22	4.23
8. Assembling and installing dairy operation equipment	4	0	7	7	4	22	2.68
9. Sanitizing and maintaining milking equipment	24	3	5	0	0	22	4.41
10. Milking cows	12	3	2	0	0	22	4.68
11. Handling and utilizing animal wastes	12	6	2	1	1	22	4.23
12. Marketing dairy production and dairy cattle	8	6	4	2	2	22	3.73
13. Follow general safety practices	17	5	0	0	0	22	4.77
14. Fit and show dairy cattle	4	6	6	1	5	22	3.14
DUTY AREAS - LIVESTOCK PRODUCTION CLUSTERS							
1. Selecting swine breeding or feeder stock	10	4	1	2	0	17	4.29
2. Breeding sow and gilts	12	2	1	2	0	17	4.11
3. Formulating feeds and feeding hogs	0	9	4	2	2	17	3.18
4. Maintaining hog herd health	5	4	6	2	0	17	3.71
5. Handling and caring for animals	12	0	3	0	2	17	4.18
6. Disposing of animal waste (swine)	15	2	0	0	0	17	4.88
7. Maintain swine building and equipment	8	5	3	1	0	17	4.18
8. Marketing and shipping hogs	10	4	1	2	0	17	4.29
9. Selecting beef breeding for feeder cattle	12	2	2	2	1	19	4.16

	Outside Assist. Not Required	Little Need For Outside Assist.	Outside Assist. Necessary But Not Essential	Great Need For Outside Assist.	Outside Assist. Required	Total	Mean Of Performance Levels
DUTY AREAS - LIVESTOCK PRODUCTION CLUSTER (continued)							
11. Handling and treating beef cattle	9	7	3	0	0	19	4.32
12. Planning and feeding for economic gains	3	7	6	1	2	19	3.42
13. Maintaining beef cattle buildings and equipment	11	3	4	1	0	19	4.26
14. Marketing and shipping beef cattle	10	3	4	2	0	19	4.11
15. Observing legal practices in meat production	8	4	3	2	2	19	3.74
DUTY AREAS - CROP PRODUCTION CLUSTER							
1. Follow legal practices in crop production	12	6	3	1	2	24	4.04
2. Determine soil and water conservation measures for crop land	6	6	8	1	3	24	3.46
3. Calculate the economics of crop production	7	9	6	1	1	24	3.83
4. Identify forage crop plants and seeds	13	6	2	2	1	24	4.17
5. Establish forage seedings	17	4	1	1	1	24	4.46
6. Plan and carry out soil nutrient program for forages	1	5	11	3	4	24	2.83
7. Identify and control major crop pests (insect, weeds and diseases) for forage, small grain and corn	2	4	10	4	4	24	2.83
8. Harvest and store forages	17	5	1	0	1	24	4.54
9. Identify small grain seed & select varieties	12	6	4	1	1	24	4.13
10. Establish small grain plantings	17	5	2	0	0	24	4.63
11. Fertilize small grain	18	3	3	0	0	24	4.63
12. Harvest and store small grain	19	4	0	0	1	24	4.67
13. Evaluate varieties and select seed corn	11	5	6	1	1	24	4.00
14. Plan and apply corn fertilizers	17	6	1	0	0	24	4.67
15. Prepare seedbed and plant corn	19	3	1	0	1	24	4.63
16. Harvest, condition and store corn as grain	18	4	1	0	1	24	4.58
17. Harvest and store corn as silage	16	6	0	1	1	24	4.46
18. Market corn	10	3	7	3	1	24	3.75
19. Evaluate and select soybean seed	3	0	1	1	1	6	3.50
20. Plant soybeans and apply nutrients	4	0	1	0	1	6	4.00
21. Harvest, condition and store soybeans	4	0	1	0	1	6	4.00
22. Market soybeans	1	1	1	2	1	6	2.83

	Outside Assist. Not Required	Little Need For Outside Assist.	Outside Assist. Necessary But Not Essential	Great Need For Outside Assist.	Outside Assist. Required	Total	Mean of Performance Levels
DUTY AREAS - AGRICULTURAL MECHANICS CLUSTER							
1. Recognize the need for and practice machine safety	19	3	2	0	0	24	4.71
2. Identify and locate essential maintenance information	11	9	1	2	1	24	4.13
3. Identify tools, hardware and machinery used on the farm	21	3	0	0	0	24	4.88
4. Set up and maintain shop work area	17	6	1	0	0	24	4.67
5. Identify and select lubricants and fuels	13	5	5	1	0	24	4.25
6. Maintain hydraulic systems	7	3	8	4	2	24	3.38
7. Select, maintain and operate farm power units	14	7	2	1	0	24	4.42
8. Select, maintain and operate tillage machines	15	5	3	0	1	24	4.38
9. Select, maintain and operate planting machines	13	8	3	0	0	24	4.42
10. Select, maintain and operate sprayers and fertilizer applicators	8	10	2	3	1	24	3.88
11. Select, maintain and operate harvesting machines	11	7	4	1	1	24	4.08
12. Maintain and operate feed handling systems	14	8	2	0	0	24	4.50
13. Maintain farm water systems	6	7	3	4	4	24	3.29
14. Operate and update manure handling	11	5	6	0	2	24	3.96
15. Maintain agricultural buildings and structures	11	5	6	2	0	24	4.04
DUTY AREAS - FARM BUSINESS MANAGEMENT CLUSTER							
1. Identify personal and economic goals	13	6	4	1	0	24	4.29
2. Record and utilize farm business transactions	11	4	5	4	0	24	3.92
3. Plan and implement crop production programs	10	9	1	3	1	24	4.00
4. Plan and implement livestock production programs	11	9	1	2	1	24	4.13
5. Plan the farm equipment and machinery program, building and structures	7	8	8	0	1	24	3.83
6. Finance farm operations	4	2	7	3	8	24	2.63
7. Manage farm to maximize long term production and profitability	9	4	7	3	1	24	3.71
8. Function as purchasing agent	9	5	6	2	2	24	3.71
9. Record and maintain production records	9	6	6	0	3	24	3.75
10. Marketing agricultural products	8	6	4	3	3	24	3.54
11. Interview, hire and manage labor	15	4	4	0	1	24	4.33
12. Observe legal requirements and regulations	6	4	5	5	4	24	3.13
13. Continue personal development	18	2	3	1	0	24	4.54

COMPARISON OF CRITICALITY AND PERFORMANCE LEVELS

A comparison of a duty area's criticality and performance level will describe the competency required of a farmer for the accomplishment of that duty. A duty area with a high mean value for both criticality and performance indicates a high competency level, while low importance in criticality and performance show a low level of competence. As a means of comparison, the top ranked (by importance) duty areas for each cluster, as determined by the "Southwest" sample, are listed with the mean values for criticality and performance levels listed in parenthesis: (NOTE: Those duty areas marked with an asterisk ranked in the top five of the performance level survey)

RANK ORDER	Dairy Cluster:
1	Maintaining dairy herd health (4.75/3.27)
2	*Milking cows (4.74/4.68)
3	Selecting breeding cows and replacemnt stock (4.56/3.82)
4	*Breeding cows and heifers (4.54/4.00)
5	Formulating rations and feeding dairy cattle (4.50/3.41)

RANK ORDER	Livestock Production Cluster - Swine:
1	Maintain hog herd health (4.60/3.71)
2	*Selecting swine breeding or feeder stock (4.31/4.29)
3	*Handling and caring for animals (swine) (4.30/4.18)
4	Formulatin feeds and feeding hogs (4.25/3.18)
5	*Breeding sows and gilts (4.24/4.11)

RANK ORDER	Livestock Production Cluster - Beef:
1	*Selecting beef breeding or feeder cattle (4.26/4.16)
2	Planning and feeding for economic gains (4.15/3.42)
3	Breeding beef cows and heifers (4.12/4.11)
4	*Handling and treating beef cattle (3.97/4.32)
5	*Marketing and shipping beef cattle (3.97/4.11)

RANK ORDER	Crop Production Cluster:
1	Identify and control major crop pests of forage, small grain and corn (4.56/2.83)
2	*Plan and apply corn fertilizers (4.47/4.67)
3	*Prepare seedbed and plant corn (4.38/4.63)
4	Plan and carry out soil nutrient program for forages (4.35/2.83)
5	*Harvest, condition, and store corn as grain (4.34/4.58)

RANK ORDER	Agricultural Mechanics Cluster:
1	*Recognize the need for and practice machine safety (4.49/4.71)
2	Select, maintain and operate harvesting machines (4.29/4.08)
3	*Select, maintain and operate planting machines (4.25/4.42)
4	Select, maintain, and operate sprayers and fertilizer applicators (4.23/3.88)
5	Maintain hydraulic systems (4.17/3.38)

RANK ORDER	Farm Business Management Cluster:
1	Finance farm operations (4.64/2.63)
2	Manage farm to maximize long term production and profitability (4.58/3.71)
3	Record and maintain production records (4.45/3.75)
4	*Plan and implement livestock production programs (4.44/4.13)
5	Record and utilize farm business transactions (4.37/3.92)

In the thirty (30) duty areas listed above, twenty-two (22) duties or 73.33 percent had a performance level mean value of 3.50 or higher. 46.67 percent of the duty areas (those marked with an asterisk) ranked in the top five, in both criticality and performance level. This data provides additional support to the hypothesis that farmer must act independent of outside assistance in the performance of many duties. A complete comparison of criticality and and performance levels follows:

TABLE 11

FARM OPERATOR COMPETENCIES - COMPARISON OF CRITICALITY & PERFORMANCE LEVEL

	Mean Of Performance Levels	"Southwest" Mean Of Criticality	"Statewide" Mean Of Criticality
DUTY AREAS - DAIRY CLUSTER			
1. Observing legal requirements in dairy operations	3.64	4.29	3.70
2. Selecting breeding cows and replacement stock	3.82	4.56	4.43
3. Breeding cows and heifers	4.00	4.54	4.55
4. Formulating rations and feeding dairy cattle	3.41	4.50	4.50
5. Maintaining dairy herd health	3.27	4.75	4.52
6. Maintaining dairy buildings and structures (may include planning & construction)	3.45	4.06	3.56
7. Handling and caring for dairy cattle	4.23	4.44	4.35
8. Assembling and installing dairy operation equipment	2.68	3.93	3.41
9. Sanitizing and maintaining milking equipment	4.41	4.40	4.33
10. Milking cows	4.68	4.74	4.66
11. Handling and utilizing animal wastes	4.23	3.83	3.51
12. Marketing dairy production & dairy cattle	3.73	4.21	3.49
13. Follow general safety practices	4.77	3.96	3.75
14. Fit and show dairy cattle	3.14	2.77	2.12
DUTY AREAS - LIVESTOCK PRODUCTION CLUSTER			
1. Selecting swine breeding or feeder stock	4.29	4.31	4.23
2. Breeding sows and gilts	4.11	4.24	4.32
3. Formulating feeds and feeding hogs	3.18	4.25	4.15
4. Maintaining hog herd health	3.71	4.60	4.55
5. Handling and caring for animals	4.18	4.30	4.15
6. Disposing of animal waste (swine)	4.88	3.75	3.56
7. Maintain swine building and equipment	4.18	3.93	3.51
8. Marketing and shipping hogs	4.29	4.13	4.09
9. Selecting beef breeding or feeder cattle	4.16	4.26	4.24

	Mean Of Performance Levels	"Southwest" Mean Of Criticality	"Statewide" Mean Of Criticality
DUTY AREAS - AGRICULTURAL MECHANICS CLUSTER			
1. Recognize the need for and practice machine safety	4.71	4.49	4.53
2. Identify and locate essential maintenance information	4.13	4.02	4.09
3. Identify tools, hardware and machinery used on the farm	4.88	3.70	3.78
4. Set up and maintain shop work area	4.67	3.64	3.85
5. Identify and select lubricants and fuels	4.25	4.00	4.16
6. Maintain hydraulic systems	3.38	4.17	4.21
7. Select, maintain and operate farm power units	4.42	4.09	4.14
8. Select, maintain and operate tillage machines	4.38	4.08	4.11
9. Select, maintain and operate planting machines	4.42	4.25	4.43
10. Select, maintain and operate sprayers and fertilizer applicators	3.88	4.23	4.30
11. Select, maintain and operate harvesting machines	4.08	4.29	4.26
12. Maintain and operate feed handling systems	4.50	4.02	4.02
13. Maintain farm water systems	3.29	4.02	4.09
14. Operate and update manure handling	3.96	3.70	3.82
15. Maintain agricultural buildings and structures	4.04	3.97	3.80
DUTY AREAS - FARM BUSINESS MANAGEMENT CLUSTER			
1. Identify personal and economic goals	4.29	4.20	4.06
2. Record and utilize farm business transactions	3.92	4.37	4.36
3. Plan and implement crop production programs	4.00	4.25	4.06
4. Plan and implement livestock production programs	4.13	4.44	4.12
5. Plan the farm equipment and machinery program, building and structures	3.83	4.08	3.80
6. Finance farm operations	2.63	4.64	4.14
7. Manage farm to maximize long term production and profitability	3.71	4.58	4.31
8. Function as purchasing agent	3.71	3.75	3.58
9. Record and maintain production records	3.75	4.45	4.19
10. Marketing agricultural products	3.54	4.15	3.79
11. Interview, hire and manage labor	4.33	3.53	3.08
12. Observe legal requirements and regulations	3.13	3.87	3.46
13. Continue personal development	4.54	4.05	3.72

	Mean Of Performance Levels	"Southwest" Mean Of Criticality	"Statewide" Mean Of Criticality
DUTY AREAS - LIVESTOCK PRODUCTION CLUSTER (continued)			
11. Handling and treating beef cattle	4.32	3.97	4.10
12. Planning and feeding for economic gains	3.42	4.15	4.39
13. Maintaining beef cattle buildings and equipment	4.26	3.57	3.53
14. Marketing and shipping beef cattle	4.11	3.97	4.17
15. Observing legal practices in meat production	3.74	4.15	3.96
DUTY AREAS - CROP PRODUCTION CLUSTER			
1. Follow legal practices in crop production	4.04	3.94	3.68
2. Determine soil and water conservation measures for crop land	3.46	4.31	4.16
3. Calculate the economics of crop production	3.83	4.22	4.12
4. Identify forage crop plants and seeds	4.17	3.87	3.64
5. Establish forage seedings	4.46	4.25	4.22
6. Plan and carry out soil nutrient program for forages	2.83	4.35	4.32
7. Identify and control major crop pests (insect, weeds and diseases) for forage, small grain and corn	2.83	4.56	4.32
8. Harvest ans store forages	4.54	4.27	4.28
9. Identify small grain seed & select varieties	4.13	3.85	3.54
10. Establish small grain plantings	4.63	3.93	3.72
11. Fertilize small grain	4.63	3.43	3.24
12. Harvest and store small grain	4.67	3.91	3.54
13. Evaluate varieties and select seed corn	4.00	4.16	3.95
14. Plan and apply corn fertilizers	4.67	4.47	4.35
15. Prepare seedbed and plant corn	4.63	4.38	4.06
16. Harvest, condition and store corn as grain	4.58	4.34	4.04
17. Harvest and store corn as silage	4.46	3.86	3.87
18. Market corn	3.75	3.46	3.34
19. Evaluate and select soybean seed	3.50	2.70	2.75
20. Plant soybeans and apply nutrients	4.00	2.76	2.88
21. Harvest, condition and store soybeans	4.00	2.80	2.93
22. Market soybeans	2.83	2.81	2.82

CHAPTER IV

Summary

This study undertook the problem of identifying competencies, their importance or criticality, and the performance level required of a beginning farm operator. It is anticipated that the results of this study will be useful in setting curriculum priorities in vocational agriculture programs. In addition, the amount of instructional time devoted to a specific competency area and the level of proficiency required in that area will be validated.

The overall purpose of this project is to determine performance levels of competencies for job entry in selected VTAE programs. Specifically, the objectives of this study were:

1. Select VTAE programs with relevant occupations for study.
2. Identify and analyze task inventories relevant to the selected programs/occupations considering the following: difficulty of performance, length of time performed, importance of task, and projected need for task.
3. Validate tasks and performance levels required on the job.
4. Translate analysis of tasks and performance levels on the job into recommended performance levels of competencies taught in the corresponding curricula.
5. Field test the performance levels of competencies for job entry for the selected curricula.
6. Evaluation the instruments and procedures developed.
7. Prepare and disseminate final report.

Five cluster areas important to the agricultural economy of Southwest Wisconsin were identified. A list of duties and tasks were developed for each cluster. After each list was validated, by an agricultural instructor well qualified in each cluster area, a survey instrument was prepared. The final instrument included the following number of duty areas and tasks:

	DUTIES	TASKS
Dairy Production	14	288
Livestock Production	15	341
Crop Production	22	217
Agricultural Mechanics	15	172
Farm Business Management	13	162

A Likert-type scale was used to obtain a mean value for each duty and task. Possible responses and their numerical value were:

OF NO IMPORTANCE	1
OF LOW IMPORTANCE	2
OF MEDIUM IMPORTANCE	3
OF HIGH IMPORTANCE	4
OF EXTREME IMPORTANCE	5

Two sample populations participated in this study. High School agriculture teachers in the Southwest District were invited to nominate farm couples from their respective high school ditricts. This resulted in the participation of 145 people, husband & wife teams, representing 80 farm operations which were summarized as the "Southwest" sample. Teachers of agriculture in the Wisconsin Vocational, Technical and Adult Education system were requested to secure one or more completed clusters from farmers in their area. This group was summarized as the "Statewide" sample and provided data from 57 Dairy, 34 Livestock Production, 51 Crop Production, 42 Agricultural Mechanics, and 49 Farm Business Management participants. In additon, the "Southwest" sample completed a profile sheet that revealed pertinent information about the participants and their farm operations.

Once information on the significance and importance of the duty areas was obtained, a new instrument was developed to measure performance levels for each duty. Again, a likert - scale was used to collect data on the mean value for each duty. Possible responses and their numerical value were:

OUTSIDE ASSISTANCE REQUIRED	1
GREAT NEED FOR OUTSIDE ASSISTANCE	2
OUTSIDE ASSISTANCE NEEDED BUT NOT ESSENTIAL	3
LITTLE NEED FOR OUTSIDE ASSISTANCE	4
OUTSIDE ASSISTANCE NOT REQUIRED	5

This sample population consisted of 24 farmers attending classes at Southwest Tech. Due to time constraints and for the sake of brevity, these participants were surveyed on the perfomance level required to accomplish the duty. The tasks listed under each duty area are considered to have the same performance level as the duty area.

CONCLUSIONS

The findings of this study were the result of a direct survey of farm operators. The duties and tasks were validated by qualified people prior to being submitted to the framer participants. The mean values determined by the two sample populations may be taken as a reliable measure of the importance of duties and tasks to an employer of a beginning farm operator.

This study indicates that a majority of the duties and tasks, listed on the survey instrument, to be of high or extreme importance for survival and growth as a farm operator. Those duties and tasks with a mean of 3.75 and above indicate a very strong need for success in farming. This study also shows that a fram operator must rely on his/her own skills and expertise, and act independent of outside assistance. Those duties with a performance level mean of 3.50 and higher are required for success in farming.

All the objectives of the study were met with the exception of objective number (5), "Translate analysis of tasks required on-the-job into recommended performance levels of competencies to be taught." The quantity of work to achieve this objective will require considerable more time. Time not available within the time schedule of this report.

RECOMMENDATIONS

1. A meeting with vocational agriculture instructors of the Southwest Wisconsin Vocational, Technical and Adult Education District, resource people from the Wisconsin Department of Public Instruction, representatives from the Wisconsin Vocational, Technical and Adult Education Office, and agriculture instructors from the University of Wisconsin-Platteville, should be convened to share the results of this study and to determine:
    - (A) Where tasks should be taught (high school, post high etc.)
    - (B) How can current curriculum be improved through utilization of this research
2. The current Farm Operator Technician curriculum should be reviewed to determine:
    - (A) That needed competencies are being taught
    - (B) That instructional objectives are stated in terms suitable for the competencies
    - (C) Those areas of minimal importance are deleted from course outlines
3. Time and resources should be assigned to develop evaluation instruments to measure level of proficiency in each competency.
4. Work should be initiated to report student progress and achievement in the Farm Operator Technician program in terms of competencies and proficiency.

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APPENDIX A

Southwest Wisconsin Vocational Technical Institute
Bronson Boulevard
Fennimore, Wisconsin 53809
Phone: 608-822-3262

Ronald E. Anderson
District Director

March 29, 1977

Letter to "Statewide" Cooperators

The Southwest Wisconsin Vocational-Technical Institute has undertaken a project to determine the competencies required of a farmer in Wisconsin. In addition, this study will serve as a pilot project which will contribute to the upcoming statewide V-TECS Study of Farm Managers. In order to meet these objectives, your help is solicited in completing the survey instrument.

We have enclosed two (2) complete packets of the duties and tasks belived to be required of beginning farm operators in Wisconsin. The tasks are divided into five clusters: Dairy-white, Meat Animal-red, Crop Production-goldenrod, Agri-Mechanics-yellow and Farm Business Management-green.

Your assistance is requested in getting AT LEAST ONE useable survey completed and returned. Two methods might be donsidered. Each farm trainer or instructor might select one participant and go through the full five sections of the survey with him. The alternative would be to give one section to a farmer who is strong in a cluster area and have him complete that section. This way five different farmers will contribute to one complete survey.

We would like to begin preliminary analysis of the data as soon as possible. For this reason, we ask that the survey be returned not later than April 25, 1977.

The results will aid in improving the educational program at Southwest Tech and will provide for a better trained farm operator. All questionnaires will be confindential and you can assure your participant(s) that his name will not be disclosed in the project report.

We realize and understand the time demand this places on you and your farm participant(s). Please accept our sincere appreciation for your assistance and extend our gratitude to your participant(s) for his cooperation. Thank you.

Sincerely,

John H. Avery
Agriculture Instructor

Robert T. Borremans
Research Specialist

Enclosures

Southwest Wisconsin Vocational Technical Institute

Bronson Boulevard
Fennimore, Wisconsin 53809
Phone 608 822 3262

Ronald H. Anderson
District Director

April 1, 1977

Letter to "Southwest" participants who completed the survey other than at meeting.

Dear Mr. and Mrs.

Thank you for expressing your interest in the Agriculture Education Improvement Study. We have enclosed a copy of the study for you to complete. A return envelope has been provided for your convenience. We ask that you return the study no later than April 25, 1977. At that time we will tabulate the results.

Again, thank you for your help.

Sincerely,

John H. Avery, Instructor
Agriculture Division

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Enclosure